The Builder.

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HOW often must the same thing be said before it will be attended to? Dr. Letheby, the City Medical Officer of Health, has recently reported to his commissioners on the condition of the houses in Plumtree-court, Holborn; and our morning contemporaries, struck with dismay, view the statement as if it had never been heard before, and write eloquent leaders on the hidden horrors thus unexpectedly brought to light!

Three years and more ago we described the very house in this very court, then as now the abode of disease, and the cradle of immorality and misery. How did the description run? "It was about two in the morning when we next wended our way to the valley of the Fleet, to visit some of the lodging-houses in that neighbourhood." . . "Leaving Field-lane, and crossing Holborn into Shoe-lane, opposite the wall of St. Andrew's Churchyard, you reach the entrance to Plumtree-court, which has long been the haunt of fever: this court extends a considerable distance towards Farringdon-street, when it goes off at right angles to Holborn: the court is very narrow and the drainage very imperfect. A sink at the bottom of this pestilent hole receives the greater part of the refuse of the place: it is often stopped, and then a pool of considerable extent is formed. Pulling the latch of the outer door of one of the houses here, and then entering, with the assent of its occupants, the room on the left, we found an atmosphere so stifling that we were forced for a moment to retreat. There were two beds in the room: in one, which seemed to have heads all round it, were no fewer than nine women and children. They were stored so oddly and so thickly, that it was not an easy matter to count them even by the strong light of the policeman's lantern. In the other bed were a man and a lad, and in a small room, or closet leading from this room, three other persons were sleeping. There was little ventilation. Had there been *none*, assuming that each respiration is forty cubic inches, the respirations twenty a minute, and that the existence of ·08ths. of carbonic acid is destructive, *the occupants of the front room must have died in eight hours!* Pondering on what we had seen, and weighing the possibility of improvement before the *infant-school* had done its work, we we were glad to make our way homeward, to freer air."*

This statement was reproduced and commented on in many journals, and was afterwards by us published in "London Shadows;" but no amelioration appears to have resulted, and now three years afterwards the metropolis hears the description with the same expressions of astonishment as before, admits the frightful evils to which such a state of things gives birth, lifts its hands—and will then probably forget all about it, as before. Let us hope, however, it will not be so.

"We arrived at the court," says the medical officer, "before the occupants were out of their beds, and the sickening odour which pervaded the lower rooms of most of the houses was almost overpowering. At No. 28, on the ground-floor, there was a small front room having an area of about 700 cubic feet, in which there were two wretched beds, from which five adults and four children had just arisen; behind this was another dark den, of 640 cubic feet in area, on the floor of which there were three heaps of rags, where two men, one woman, and two children were then lying. They were huddled together without the smallest regard to decency, and I was informed that they were chance lodgers. The landlord himself was one of the occupants of this miserable abode. The other rooms of the house were in a similarly wretched state, and for the accommodation of the many families which tenanted them there was but one watercloset, in a small back yard, which was so abominably filthy that I could not approach it. No. 6. The single room which formed the ground-floor had an area of 967 cubic feet. In this there were three beds lying on the floor, upon which two men, five women, and five children had been sleeping. In another small room, at the top of the house, there were two wretched families of six individuals, who had taken their night's rest upon a heap of shavings. The room was destitute of every article of furniture. At No. 9, which is a house of fifteen rooms, the largest of which is only 825 cubic feet, there were sixty-seven occupants, consisting of fourteen men, twenty-six women, and twenty-seven children. In two of the rooms the poor creatures were wholly destitute, and they were taking their rest upon the bare floor. This house was so overcrowded that the average cubic space per individual was only 175 cubic feet; in one room it was only 86¾ feet; and in another 93½ feet. No. 24, which is a small house of three stories in height, with four rooms, contained forty individuals, consisting of eighteen adults and twenty-two children. It has no back yard, and the ventilation is most imperfect."

The medical officer urged, as we have done for years past, that before we demolish those places in which the poor have hitherto lived, we should provide other and better places for their reception. While they are allowed to believe that crime, and disease, and wretchedness "are their inheritance, we can never expect to see them rising above their present miserable condition; nor can we ever hope to find that education, with all its power, can have any influence upon the minds of those who are too ready to receive the stronger and earlier impressions of vice. That which has already struck my attention during my visits to such localities as these, has been the fact that young children are, from their very infancy, made familiar with the worst scenes of dissipation and immorality; for to be kept in idleness, and to witness day by day the conduct of those who have no regard for the commonest decencies of life, is to insure another generation of criminals, whose habits may be even worse than those of their predecessors." He recommended that these houses should be at once subjected to the rules and regulations of common lodging-houses, and the commissioners adopted the recommendation, and ordered it to be acted on.

"Life," says Dr. Acland, "is a holy thing; and if communities throw away the lives of the individuals who compose them, or make these sickly, short, and miserable, the community will, in some manner, 'pay for it.' It will have work done badly by the crushed artisan while he lives; it will have to maintain him for years in his sickness, and his children on his death."*

We hope to hear before long that the Corporation have resolved to proceed with the erection of a pile of dwellings for the labouring classes, which has been long talked of. Some of the metropolitan parishes are becoming more and more overcrowded every day.

Let us in a parenthesis, by way of relief from the unpleasantness of the details we are forced to go into, here refer to the love of "art" which we find very often exhibited in the most miserable quarters, in the shape of plaster casts and little prints,—not of very refined character, it is true, but still agreeable and cheering as evidence of a striving upwards. The painted parrots and spotted cats, and red and blue varnished prints, which not many years ago *decorated* homes of greater pretence, have found a resting-place lower down in the social scale. Our sketch (see next page), an actual chimney-piece, will serve as a record of some well-known barbaric favourites.

We may safely anticipate that great benefits will result from the labours of the various Officers of Health, who have been appointed under the Metropolitan Management Act. We have before us a very satisfactory preliminary report from the medical officer of St. Leonard's, Shoreditch, Dr. Barnes, wherein he justly asserts that,—

"It is impossible to call into action such a well-devised sanitary administration as will effect material diminution in the rate of sickness and mortality in a district, which will not *pari passu* increase the value of the property, and lessen the burdens upon it. To communities, as well as to individuals, there is nothing so expensive, so fatal to prosperity, as sickness. To a productive and labouring community, such as that of Shoreditch, health is the chief estate. If we observe the analogy that exists between the welfare of an individual and the welfare of a community—and the analogy is so true that it is the basis of all sound political economy and good government—do we not find that in the case of sickness in an individual, if one organ is diseased, increased labour is thrown upon the rest, that the functions of all are disturbed and weakened, and that the whole system suffers? A community is but a system of individuals: if, therefore, one portion of that system be disabled by sickness, every other portion will feel the blow; the whole community will be taxed to support that part which is rendered incapable of supporting itself."

It is, as we have again and again said, a plain matter of self-interest, as well as a solemn obligation, to exercise the most vigilant care in preserving to the poor their only worldly possession—their health and capacity for self-support.

The area of Shoreditch comprises 646 statute acres, or about one square mile; and Dr. Barnes calculates that the entire population in 1745 was only 17,255, if so much. Let us see what it is now. By the census of 1831, the population was 68,564: in 1841, it had risen to 83,432; and in 1851, to 109,257. At the present time there are probably 125,000 persons crowded and compressed within the 646 acres comprised within the boundary of 1745.

The Report says:—"There is a constant and rapid flow of population into Shoreditch. It is in this circumstance that I see one of the most alarming dangers to the health of the district. The area does not enlarge, and yet, year after year, dense crowds of human beings, bringing with them other crowds of the living creatures that attach themselves to man, are packed and squeezed into that limited area. The most cursory glance into the courts and by-places of the district will satisfy us that the growth of the population has far outstripped the growth of the sanitary provisions necessary to provide for the accommodation and health of the masses pouring in. The progress in the construction of sewers, drains, the supply of water, the improvement of the dwellings, is, daily, more and more disproportionate to the necessities of the inhabitants. The causes of disease are therefore increasing at an accelerated ratio, and may at any moment assume an activity and a virulence beyond control."

What is the present sanitary condition of the district? In 1855, the total deaths registered in Shoreditch amounted to 2,985: of these, 639 were caused by typhus, smallpox, scarlatina, and other epidemic or endemic diseases. That is, one death in every five and two-thirds arose from causes directly traceable to removeable causes; and, from facts which have been made

* Vol. XI. p. 200.

* From "Health, Work, and Play," a valuable little tract just now published by J. H. and J. Parker, Oxford.

A Chimney-piece in Plumtree-court, Holborn.

manifest to Dr. Barnes, he is satisfied that the number of deaths referred to epidemics is very far from adequately expressing the destruction of human life, or the impairment of health, resulting from removable causes. Typhus—a disease really more terrible than the cholera itself, because it is ever insidiously at work sapping the strength of the community, is probably never absent from Shoreditch. It has made itself a home in the parish, where it lives—upon the life-blood of its hosts.

The death-rate in Shoreditch is very high,—there are annually twenty-eight deaths for every 1,000 persons living;—higher indeed than in any other metropolitan district. It must be Dr. Barnes's business to lower it, at any rate to the average which is about twenty-one in the 1,000. Even at that, however, it ought not to remain long. Our readers will remember that in the various houses which belong to the Society for Improving the Condition of the Labouring Classes, the deaths last year were only seven in the 1,000! Good encouragement indeed for perseverance! We understand that only one case of typhus fever has ever occurred in the society's buildings, and that in that instance the person was ill before he came there.

The medical officer of health at Kensington, Mr. Francis Godrich, sent in a report not long ago on the present condition of the Potteries, where the death-rate in 1848-9 was 60 in 1,000! the average age at death being but eleven years and seven months!! Mr. Godrich calls on the District Board as a first step to fill up the pool of stagnant water known as the "Ocean," described by us some time ago; and we earnestly hope this and his other recommendations will be forthwith attended to. If the whole population of London and its suburbs were placed in the same good condition as are the tenants of the society to which we have referred, thousands and tens of thousands of lives would be saved annually.

Thousands of lives! The fact is surely worth thinking over.

STATUES FOR THE NEW HOUSES OF PARLIAMENT.—Statues of Burke and Curran have been commissioned for St. Stephen's-hall, at the sum of 1,000*l.* each. Mr. Theed is to execute Burke, and Mr. Carew, Curran.

ON THE VARIETIES OF STONE USED FOR ARCHITECTURAL CARVING.*

FORMERLY, the only economical mode of conveying ponderous blocks of stone to a considerable distance, was by sea or by navigable rivers. Canals were then introduced. Latterly the means of transport have been wonderfully increased by railway communication; therefore it becomes essential to ascertain whether better materials than those which have heretofore been employed in any given place, may not be obtained from other, although more distant localities, upon equally advantageous terms.

Before I attempt to describe the various qualities of stone used for architectural carving, the proper course of proceeding will be to give some idea of the different districts where stone quarries are generally found; and under what peculiar circumstances they are situated, with reference to their geological age and condition; or, in plainer language, before you can carve a stone, you should know where to look for one that is likely to suit your purpose.

It has been remarked by Dr. Buckland, in his "Bridgewater Treatise," that if a stranger, landing at the extremity of England, were to traverse Cornwall and the North of Devonshire, and, crossing to St. David's, should make the tour of North Wales, and passing thence through Cumberland to the south-western shore of Scotland, he would conclude from such a journey, that Britain was a thinly peopled, sterile region, whose inhabitants were principally miners and mountaineers.

Another foreigner, arriving on the coast of Devon, and crossing the Midland Counties, from the mouth of the Exe, to that of the Tyne, would find a continued succession of fertile hills and valleys, thickly overspread with towns and cities, crowded with a manufacturing population, whose industry is maintained by the coal with which the strata of these districts are abundantly interspersed.

A third foreigner might travel from the coast of Dorset to the coast of Yorkshire, over elevated plains of limestone, or of chalk, without a single mountain or mine, or coal-pit, or any important manufactory, and occupied by a population almost exclusively agricultural.

Let us suppose these three strangers to meet at the end of their journeys, and to compare their respective observations, how different would be the results to which each would have arrived, respecting the actual condition of England. The first would represent it as a thinly peopled region of barren mountains; the second, as a land of rich pastures, crowded with a flourishing population of manufacturers; the third, as a great cornfield, occupied by persons almost exclusively engaged in the pursuits of husbandry.

There is much truth in these remarks of Dr. Buckland; and it leads us to inquire into the cause of such very different occupations of the inhabitants.

Without travelling through the length and breadth of the land, we may take a general survey of England, by a glance at a geological map; by which we learn that the ground, a little beneath the vegetable soil, is composed of various sorts of rocks, arranged in stripes of different widths, which may readily be distinguished from each other by certain peculiarities. In England, these stripes take a general direction from north-east to south-west, and are somewhat parallel to the general line of hills. The origin, composition, order, and arrangement of these rocky masses, form the basis of geological science.

I shall endeavour to explain the outline of that part of the leading doctrines of geology as they are now generally admitted, which will be sufficient for our present purpose. In giving this outline, it is only to render my description of some of the principal stone districts more intelligible. If therefore some of my statements appear startling, and perhaps even improbable, as they are very likely to do, to those who come fresh to the consideration of the subject, they must either give me credit for advancing nothing but what is now admitted by men of science, as an established truth, or they must take the trouble to investigate the subject for themselves, and satisfy their doubts, by applying at the original sources of information.

In travelling along a line of railway, where there are occasionally deep cuttings, or if we notice high cliffs by the sea-side, we observe heaps of gravel, sand, clay, and different kinds of stone, to all appearance as if chance only had tossed them together in a confused heap. Yet amidst all this apparent confusion, geologists have discovered a certain degree of order prevailing; and that among these immense masses of rocks, broken and disturbed though they be, a regular succession is observed, which is nearly the same in all countries; and where their original position has undergone great subsequent disturbance, there still remain proofs of the order that once reigned. There are no conflicting laws in the material world; laws as fixed and immutable prevail in the disposition

* The substance of a lecture delivered by Mr. C. H. Smith, at the Architectural Museum, Canon-row, on Monday, the 26th May.

of rocks, as in all other of Nature's works. In fact, the same arrangement appears to be general, and must therefore depend upon general causes, which have on all occasions exerted the same influence from one extremity of the earth to the other. That which now appears to have been ordered for the wisest purposes, was, in ruder times, degraded by the misapplied title of "chaos."

There is much evidence to render it probable, that the entire materials of the great globe we inhabit, were at one time in a fluid state; and that the cause of this fluidity was heat. Upon cooling, the first result would be, the formation of various crystalline rocks of the granitic series, around an incandescent centre of melted matter. The gradations are innumerable which connect the infinite varieties of granite, porphyry, and basalt, with the lavas that are at this day ejected by volcanoes. This hypothesis is now admitted by the common consent of nearly all modern geologists and chemists.

Living, as each man does, but a comparatively short period, and seeing but a very small portion of the surface of the earth at any one time, it is somewhat difficult to conceive that the action of volcanoes and earthquakes can have had a general effect in changing the position of land and water. We occasionally hear of a volcanic eruption or an earthquake, and for the most part look upon it as something partial, confined to a certain district, and, on the whole, as unimportant to the rest of the world. There is, however, strong reason to believe that volcanoes and earthquakes are the operations of a power which is everywhere present beneath the ground, in which we all have an interest; and to which we must ascribe the circumstance of the land being raised above the waters, as well as the undulations of hill and dale. Such operations may have been more violent and extensive in earlier times than at present; although an apparently insignificant cause will produce a very surprising effect, if frequently repeated during a long succession of ages.

The first part in classification is the division of rocks into three great groups: the crystalline or igneous, sedimentary or aqueous, volcanic or lava, &c.

By heat, under great pressure, dark limestones, replete with shells and corals, may be converted into white statuary marble; and hard clays into slates of various kinds, all signs of organic remains having been obliterated; these are intermediate or altered rocks.

The very lowest sedimentary rocks, such as slate, contain no traces of inhabitants of the seas, in which they were accumulated; it is supposed that the heat during those periods must have been adverse to animal existence.

We are apt to regard the earthy foundation, on which the architect raises an edifice, as a specimen of duration and stability; but proofs of violent disturbances are conspicuous in every locality. All the materials of the sedimentary rocks appear to have been, originally, gradually deposited in nearly horizontal strata, at the bottom of the ocean, or at the bottom of inland seas, lakes, or estuaries. Thus formed, the collective heap remained in a state of perfect quiescence, while it became somewhat indurated into a mass. From the numerous contortions, and generally more or less inclined positions of strata in all countries, there cannot be a doubt of our islands and continents having been heaved up from the bed of the sea, by some violent terrestrial commotion, which has, in many cases, placed the rocks at a very considerable elevation above the waters. Many terrible convulsions have repeatedly broken up the surface of our earth, during which land and water have alternately been uppermost. England, Scotland, and Ireland have evidently undergone many submersions and elevations, before they rose from the mighty deep in their present natural condition. How long these surprising operations were in progress, or how many ages elapsed in a state of comparative tranquillity, between one terraqueous convulsion and another, is a question, among many more, which sets our researches at defiance; for conjectures are endless; even the labours of the wisest men afford but a glimmering light to direct us in tracing such wonders of Almighty power. But of this we are certain, that the solid earth may at one time form the depths over which the stormy billows wave, at another time may be elevated, and become dry land, where corn may wave, where the loveliest flowers may be organised and fructified, and the lofty patriarchs of the forest upheld for the nourishment and enjoyment of numerous tribes of the higher orders of animals. All is in a state of mutation. Nothing is more evident to geologists than a perpetual series of alterations; there can be discovered no vestige of a beginning, no prospect of an end.

The solid earth, which now appears above the surface of the sea, with its stores of organic remains, may be compared to a large collection of authentic records, that will reveal to man, whenever he may be capable of rightly interpreting it, a continued narrative of events, which commenced at a period indefinitely remote, and probably succeeded each other after intervals of vast duration. Unlike the records of human transactions, these are not liable to the suspicion of having been forged or mystified through intention or ignorance. In them we have neither to fear the dishonesty of artful statesmen, nor the blunders of unlettered and wearied transcribers. As the Nineveh marbles record the existence of a civilized people on the banks of the Tigris, in remote ages, so the shells entombed in solid stone, at the summit of the Alps and Pyrenees, attest that there was a time when the rocks of those mountains occupied the bottom of a sea that was peopled by numerous species of animals, differing in many respects from any which now exist.

As far as we know at present, granite is supposed to be the oldest or first formed of all rocks, and is generally considered to dip under, or to be found beneath every other formation; notwithstanding, it forms some of the most elevated mountain masses. In the British Isles, the oldest rocks, such as those of granite, slate, and certain varieties of marble, called "Mountain limestone," compose the highest eminences along the western part of our island, from Cornwall and Devonshire, great part of Wales, Cumberland, and the western portion of Scotland. The mountains of Snowdon and Skiddaw are composed of rocks very low in the series; whereas, the marsh lands of Lincolnshire, Cambridge, Essex, and many other parts on the eastern side of England, which are scarcely above the level of the sea, are composed chiefly of gravel, sand, clay, and the most recent geological formations.

Granite is generally considered to be a mixture of three substances, quartz, felspar, and mica, in various proportions. Occasionally, one or other of these bodies is altogether absent. Felspar colours the red granite, black mica the grey.

In speaking of sedimentary rocks, it is necessary first to show how such rocks were formed, or how stratification commenced. The solids of the globe,—granite, for instance,—cannot for a moment be exposed to water, or to atmospheric influence, without becoming liable to decompose and change their character and appearance. They instantly begin to wear down. This operation proceeded with as much certainty in earlier times as it does now, but probably upon a much more magnificent scale. The earliest stratified rocks contain no matters which are not to be found in the primitive granite. They are the same in material, but only changed into new forms and combinations.

Some rocks are composed almost exclusively of only one of the materials of granite; the mica schists, for example, of nothing but mica; the slates and clays of little else but decomposed felspars; and the sandstones almost wholly of quartz? Suppose that a river has a certain quantity of material suspended in its waters, it is evident that it will first deposit the largest and heaviest particles, and carry the lightest farthest on. To such a cause is it owing, that some of the materials of decomposed granite have settled in one place and some in another, and this wholly independent of chemical solution.

Granite is generally composed of coarse grains or crystals, of so hard and refractory a nature as to render it only suitable for those bold massive structures which have scarcely any minute-carved work. The statue of William IV. at London-bridge is of granite. For such a purpose granite is admirably adapted, and not likely to be stolen for the value of the material, as is the case with bronze.

In Cornwall and part of Devonshire the granite is remarkable for the superabundance of well-defined large crystals of white felspar which it contains. At the Earl of Morley's quarries, in the vicinity of Prince-town, Dartmoor, the granite is more or less decomposed to the depth of 30 or 40 feet. This surface granite has been much used, because it is cheapest; the result is, that in buildings, after some years, such as the Dartmoor Prison, each block of granite has become porous, absorbing moisture continually, and rendering the cells so damp that the walls have been covered on both sides with cement and tiles.*

If the felspar of the granite be removed by the process which I have described, a rapid disintegration of the quartz and mica must readily take place, leaving the quartz grains, or silicious sand and mica entirely separated from the clay and alkaline salts of the decomposed felspar. If sufficient time be allowed, the sand will ultimately become indurated into compact sandstone. This process of decomposition and partial induration must have gone on to an enormous extent, and continued through a vast period of ages, in order to have produced all the sandstone rocks which now constitute so large a portion of the earth's surface.

All sedimentary or aqueous rocks appear to have been formed either entirely under water or by frequent alternations of wet and dry. Sandstones frequently present a laminated structure, as if by the overflow and recession of a tide, which constantly left a sandy sediment, with minute plates of mica from the decomposed granite. These plates, being thin compared with their size, are almost invariably found with their flat surfaces parallel to the lamination; thus indicating the bed-way of a stone, by their presenting a spangled or glittering appearance when viewed in a direction to reflect the light; an effect not to be met with on viewing a surface across the strata.

There is one peculiarity in the sandstones which I think deserves notice, that is, the labour of converting them to decorative purposes: architectural ornaments, whether mouldings, carvings, or other decorations required to be well executed—particularly if on a small scale,—will unavoidably occupy much time if carved in sandstone, on account of the nature of the material, which is so destructive to edge-tools. In confirmation of this assertion, it is necessary to remark that the only material for sharpening edge-tools is sandstone, either as a hone or Turkey-stone used by joiners and cabinetmakers, grind-stone, scythe-stone, and many more, all of which are of a sharp sandy texture. Therefore, it is easy to conceive that the same kind of stone which is experimentally found to sharpen tools most expeditiously will also be the readiest to destroy their cutting edge, and thereby not only retard the progress of the workman, but occupy his time in frequently re-sharpening them. Quartz is one of the hardest substances in nature,—much harder than steel; therefore, instead of the chisels cutting the stone, the stone cuts the chisels, and a portion of the steel is left upon the stone after every blow. The actual effect of the tools on sandstone is to force the grains to separate from each other by concussion, for it is impossible to cut a hard substance with a comparatively soft instrument.

LIMESTONE.

The term limestone in its most extensive meaning, is one of the most abundant substances in the creation. Fish shells, corals of all kinds, and the remains of crustaceous animals, altered and modified in a thousand different ways, in the great laboratory of nature, constitute, almost exclusively, the calcareous rocks which form about an eighth part of the external crust of the globe. A minute fragment of chalk, of Portland or Bath stone, or of many varieties of marble, when highly magnified, presents unquestionable proofs of its having originated from the animated productions of the waters. Limestone

* Felspar is a decomposing substance. A few miles north of Plymouth the streams have a milky appearance. This produces clay for china and porcelain, to be seen at the Museum in Jermyn-street.

that is hard enough to receive a good polish is usually denominated "marble," although it may possess no chemical qualities but such as are common to all calcareous earths.

The oolitic rocks traverse England from the coast of Dorsetshire to the extremity of Yorkshire; in many places affording prodigious quantities of excellent stone, fit for buildings of the plainest, or of the most richly ornamented character; but variations of structure, hardness, and durability, are found in different quarries, tending to show the changeable nature of the subdivisions, even in short distances, throughout the entire district, which extends nearly 300 miles.

Some of the shelly varieties of limestone obtained from the oolitic series of rocks are amazingly durable for architectural works; but they are generally of too coarse a texture, and the shells interfere so as to prevent the possibility of minute carving being well executed in a material which is so varied in its texture; being hard and soft, close and open within the space of a few inches. The best kinds of shelly limestone are from Barnack, near Stamford, of which Peterborough Cathedral and many of the old Churches at Stamford are built; from Taynton, near Burford, of which the durable parts of the buildings at Oxford are constructed; Ham Hill, near Yeovil, used at most of the best buildings in that neighbourhood; and from Weldon in the wood, Northamptonshire, of which the oldest buildings at Cambridge are constructed: all these are merely varieties of the oolitic rocks.

Many quarries of excellent free working limestone are situated in the northern part of the oolitic district; such as the Ancaster and others in Lincolnshire, the Ketton in Rutlandshire, and many more; all of which are well suited for the carver. Most of these stones are rather soft, therefore may be expeditiously wrought into elaborate ornaments; and as they have been used in the neighbourhood of the quarries during several centuries, we can form an opinion of their fitness and durability. In Somersetshire and its vicinity there are almost inexhaustible quarries of oolite, very soft, therefore very expeditiously worked, consequently in great demand. Wells Cathedral is built with Doulting stone, which is similar in many respects to Bath, and is much decayed; whereas Glastonbury Abbey is said to have been built with stone from some of the Doulting quarries, and although 700 or 800 years old, is still in excellent preservation.

Bath stone is so well known that I need scarcely mention it. Large quantities continue to be used in buildings where present economy is more studied than future reputation. The principal quarries are at Box, Coombe Down, and Monckton Farleigh. The stone from each of these districts, and even in the same quarry, where there are generally a number of beds lying upon one another, is frequently found to differ, in some of the minor characters, from all the rest; such as being harder, coarser, more or less durable, &c. all of which are indiscriminately sold in the markets under the general name of "Bath stone," and it rarely happens that an architect specifies what kind of Bath stone is to be used. It is always understood that the materials are to be of the best kind; and it unfortunately too often happens that the stone which looks best when fresh from the workman's hand is frequently of a description most subject to premature decay. If it be left to the contractor's choice, he is sure to select the stone that may be most expeditiously worked.*

Portland stone is also a well-known material, and has been the chief stone used for ornamental architecture, not only in the south of England, but in many parts round the coasts of this country and Ireland, from the time of Inigo Jones to this day. The Banqueting-room or military chapel at Whitehall was begun in the year 1619, and finished in two years. As far as I can search or learn, this is the earliest building of magnitude constructed with Portland stone in London, or at a considerable distance from the quarries. If I call your attention to the beautiful carvings of fruit and flowers, of Corinthian capitals and statuary, about St. Paul's Cathedral, I feel assured you will require no further proof that Portland is decidedly one of the best free working stones that can be used for architectural carving. The whole of those decorations have been finished 150 years, some of them twenty or thirty years' longer; the greater part elevated above the surrounding buildings, and thereby exposed to all aspects, in an atmosphere charged with smoke and other impurities. Viewing this sacred structure collectively, it may be considered a satisfactory example of the fitness of Portland stone for such purposes; for although there may be symptoms of decayed stone in some few parts, the carved work generally may be said to be perfect, although sadly blackened with the smoke of the metropolis.

Caen stone has always been in great demand, because an immense amount of ornament may be executed for a comparatively small outlay. Wherever water-conveyance can be obtained, Caen stone is probably the cheapest stone that can be had for architectural decoration. It may be worked with great facility, perhaps more expeditiously than any other stone whatever; and it is quite immaterial as to the stones being placed in a building on their natural bed.

Caen stone, however, is not a durable material, and it is advisable to cover the projections with thin lead, to keep out the wet. There have been many ingenious plans for hardening the surface of soft stones, but they all want time to try their efficacy.

MAGNESIAN LIMESTONE.

Without a chemical test, some of the varieties of magnesian limestone might easily be mistaken for soft Portland stone, especially if they are of the same colour and partially oolitic. Two specimens, one from Cadeby, the other from Brodsworth, both in the neighbourhood of Doncaster, may be sawn dry with a common pegtoothed saw, and worked with a drag and tools the same as are generally used for soft stone; yet both these specimens have a large proportion of magnesia in their composition.

Time will not allow of describing the several varieties of Magnesian limestone, therefore, the few remarks which I have to offer, must be confined to the stone now being used at the new Houses of Parliament. Since the commencement of that magnificent work, notwithstanding an enormous quantity of stone has been obtained from the quarries, I do not perceive any material difference in its quality; occasionally slight variation may be found in the texture or hardness of some of the beds; but collectively, the produce of the quarries may be considered equal in quality to what it was at the commencement of the Parliament Houses. When first these quarries were opened, and for several years afterwards, only the eight uppermost beds were considered fit for the great work at Westminster; the stone underneath was imagined to be of too hard and coarse a texture, to be employed for superior architectural works. This idea was purely imaginary, for the number and thickness of the lower beds had not then been ascertained. Now and during the last few years, the whole of the beds, about thirteen in number, are worked, and to all appearance the quality of the stone is, with few exceptions, nearly the same in all of them; for there is no reason to suppose that generally the stone obtained from the lowest bed is not in every respect equal to that of the highest bed in the quarry. These thirteen beds compose the entire stata of Magnesian limestone to be found in the vicinity of North Anston; beneath them, after a few feet of different coloured clays, and thin rubble stone of an intermediate quality, we come at once upon beds of new red sandstone.

Since the introduction of Anston stone into the metropolis, the new material has been employed in several important edifices besides the palace of Westminster; and generally, if not invariably, has been considered satisfactory. One remarkable instance, however, is to be observed in the new buildings of Lincoln's-inn, where a large proportion of the masonry is already in a perishing condition. As sometimes happens, much useful information is obtained by searching into the cause of evident failure; therefore, at the quarries, I endeavoured to find out and examine the locality whence the objectionable stone had been obtained; and I was immediately taken by the foreman to the place, where I observed the hewn surface of the rock, especially the two uppermost beds, which had been left exposed to the weather several years, unequivocally in a state of rapid disintegration; the sharp arises and angles all rounded off, and the weathered surface for about a tenth of an inch deep, was easily abraided by the fingers: thus affording incontestable and striking evidence of the importance of avoiding the use of stone from these two particular beds, for ornamental architecture or sculptural purposes. For want of proper selection, a small quantity of this objectionable stone has been used at Westminster, but the proportional quantity is not more than might have been expected had any other stone been used.

I do not think that chemical analysis will render much assistance in determining the goodness of a stone for architectural purposes; the most accurate investigation of a chemist will give no certain test either of resistance to atmospheric influences or of rapid disintegration when exposed to weather. The same elements united in the same proportions, do not necessarily generate the same body. Common white chalk, Carrara marble, and many other varieties of limestone, when chemically examined, are all found to be composed of very nearly the same elements consolidated in the same relative quantities; yet we know they produce substances totally different in many respects. The precise causes of decay, or of duration in mineral bodies, such as building stones, are so complicated, that they often baffle our endeavours to represent them and their reactions by exact chemical formulæ. It is by some mysterious process of nature, which we do not at present understand, and generally cannot imitate; nevertheless, the visible distinction between durable and perishable stones may frequently be correctly ascertained, if diligently sought for.

A few hints to ascertain whether a given material is a sandstone, a limestone, or a magnesian limestone, may occasionally be useful to persons who may be in any way connected with the use of building stone. A very little chemical knowledge will show that there are extraordinary predilections amongst the atoms or molecules of substances, for each other's company; one will remain firmly combined with another till a third is introduced, when it will abandon its old companion and attach itself to a stranger. A fourth substance being added, the third will perhaps, leave the first and join the new comer.

C. H. SMITH.

* Henry VII.'s Chapel was repaired with Coombe Down stone between 1808 and 1822.

FIRES AND FIRE-PROOF BUILDINGS.

THE paper on this subject by Mr. Braidwood, (p. 258, *ante*), led to a discussion at the Society of Arts, which extended over two evenings.

Mr. Sibley, in a note to the secretary, said—"I beg to adduce one fertile source of fires, that is, the fixing of the boiler furnaces of steam-engines, and other furnaces and close fires, against party walls, in which wood plates and bond timber are not unfrequently found. Under the Act of 1844, a clear space of six inches was made imperative, between the setting of the furnace and the party wall. Under the present Act they are subject to *no* restriction or regulation whatever. The disuse of bond timber and plates altogether; the introduction of iron hoop bond, and stone templates in their place; the building of cross walls, in lieu of hollow wood partitions, would tend much to diminish the hazard of fire. Wrought-iron brestsummer girders should also take the place of wood brestsummers: when these are burnt through, it is manifest that the whole superincumbent mass of brickwork has nothing for its support."

Mr. Chadwick, C.B., in the course of his address, said, after mentioning the time which usually elapses before the engines can be got to work at a fire, he was confident that practical concurrence would eventually be given to the conclusion at which he had arrived, that the principle of all future arrangements for the repression of fires must be a constant supply of water kept at high pressure, night as well as day, and the direct application of it from the mains before the door by means of a hose and jet. By that arrangement he had proved, that

a power equivalent to three or four of the best engines might be kept constantly before each door ready for application within two minutes. Having been consulted on the subject by Mr. Edward Rushton, the late benevolent stipendiary magistrate of Liverpool, and having learned of the corroborative example of the use of water direct from the mains, first for the cleansing of the streets and houses at Philadelphia, and then for the extinction of fires, he (Mr. Chadwick) gained his advocacy of the plan at Liverpool. When, upon his advice, Mr. Rushton proposed it to a Committee of the House of Commons, the proposal was received with laughter. The very serious effect of the conflagrations in the warehousing interests at last occasioned it to prevail in Liverpool, and, as had been stated that night, with such an effect in increased safety, as was shown in the insurance charges. In a communication to him, Mr. Newlands, the borough surveyor of Liverpool, had stated the new practice: "The mains from this reservoir under high pressure are available over the whole of the town." "On arriving at a fire the stand pipe or pipes are put down, and the hose run off the reels in an instant, and, it may be, a dozen jets are playing, and the flames nearly extinguished before the engines have left the yard." "Serious fires are now seldom heard of, for before the flames can gain head the jets can *generally* be played upon them, and this is the only time that there is a chance of subduing them." The mechanical or engineering objections made to the application of the like arrangements to the metropolis were wholly illusory. On a competent and impartial examination it would be found, that what had been done in some cities might be done with economy in the metropolis and all others. The present state of things—the combined prevalence of defective legislative and administrative as well as of engineering arrangements, in the face of proved available means of protection—the weakening of the unconscious action of natural interests in precaution by unguarded full insurance, in contravention of the established principles of insurance—the temptation to the commission of crime by the absence of proper means for its detection and prosecution—the daily occurrence of fires in the metropolis, the number of horrible deaths from them, as well as the loss of property which they occasioned—the apparent apathy with which such calamities were regarded, and the rapidity with which they were forgotten—were deeply to be lamented, and would hereafter be referred to as evidence of a very low social condition, and of defective administrative capacity and organization.

Mr. John Braithwaite claimed a little to himself, as being what was termed one of the earliest and oldest fire-eaters; for that was the designation, not within the last few years, but something more than a quarter of a century ago; and it was a matter of great surprise to him to know that the means (his steam fire-engine) which were then practically and successfully adopted and approved by the public—by the many thousands who witnessed the experiments then tried—that in all these matters, which were carried out at his individual expense, he was permitted to incur such an enormous outlay of money for the benefit of the community, without having received a sixpence in the shape of reward, directly or indirectly, from any one. In the early period of the building of Drury-lane Theatre, every possible means was adopted to prevent fire occurring, under his father's directions, in conjunction with Colonel Congreve and the late Mr. Whitbread. It was carried out to a perfection that was almost unheard of, or thought to be practicable. There was not a spot in any part of that theatre but that at one moment's notice they could control any chamber, however remote or however near, by—not a deluge of water, but sufficient water at a particular moment to arrest the progress of the flames. He was disposed to believe it was not to the interest of Fire Insurance Companies to put out fires! He had evidence beyond any doubt on this point, and the remark which Mr. Braidwood made about Legislative interference led him to think from that hour the Legislature would look more into these matters than they had done before—the only safeguard between the public and the Insurance Offices—for he must tell them that in 1830, under the special request and encouragement of the Insurance Offices, he constructed that which would not prevent fires, but would and did extinguish them most effectually, and that was the Steam Fire-Engine.

Mr. Hawes denied the charge which the last speaker had brought against the insurance offices of this metropolis.

Mr. Marrable said, in the Bill of 1844, and the present Building Act of 1855, several clauses had been introduced for the prevention of fire as much as possible, by disallowing the introduction of bond timber and wood bricks, and other regulations, and for arresting its progress by subdividing buildings by cross or party walls, when they exceeded, in cubical contents, a certain number of feet. He (Mr. Marrable) was not prepared to go quite as far as Mr. Braidwood in the regulations as to the distances at which it was now the law that all pipes for warming by hot water or steam should be fixed from any woodwork, viz. three inches. When high-pressure pipes were used, the precaution was wise and necessary; but he did not think there was any occasion for such a restriction when pipes for hot water at a low pressure only were used. He feared that such a rule might be found very difficult to carry out in all cases. He also dissented from the supposition that "a chemical action took place between heated iron and wood." He believed that the only action was, that the constant heat at last reduced the wood to a state resembling touchwood, which was ready to take fire on the slightest accident. With regard to the difficulty of enforcing the rules respecting the laying hearths free of all timberwork, it should be mentioned that the builders were bound to give notice to the district surveyors, whose business it was to enforce the rules of the Act.

Mr. F. Whishaw remarked, that when this subject was brought before the Institution of Civil Engineers, about four years ago, it was stated in the course of the discussion that as bulkheads were useful in preventing fires extending in ships, party walls should be adopted in large warehouses, so as to divide the space and confine the fire to the spot where it originated. That suggestion was approved of by Mr. Braidwood, and also by Professor Hosking, the late official referee. He was glad to find that Mr. Braidwood still held to that opinion, and it seemed to him that in any future Acts relating to building, clauses to that effect should be introduced. He knew a warehouse in Bermondsey with an unbroken area of wooden flooring of three quarters of an acre. There were also many large granaries which might be easily divided and fire prevented from extending. Mr. Braidwood seemed to think that the large buildings in the City had been constructed without reference to such precautions.

Mr. Charles Mayhew said, as he was surveyor to one of the oldest insurance companies, and a district surveyor, he could speak with some confidence on the subject brought forward by Mr. Braidwood. He begged, in the first instance, to reply to the observations made relative to the steam fire-engines. The reasons why they were not generally adopted on land was, that the large quantity of water which they could supply was not, in the generality of cases, required, inasmuch as water injudiciously applied, did, very often, more damage than the fire would if left to the judicious management of the fire brigade to extinguish, which was, in most cases, stopped in a way perfectly astonishing. As regarded the structure of buildings, he was quite persuaded that unless the Legislature would adopt strong measures, fires would continue as heretofore. Houses ought to be constructed on the French system, and not as they were built here, on purpose to burn. They were piled up as the wood was placed in a grate to light a fire. The floors were wood, the partitions were wood, the stairs were wood so put together as to be all hollow, and so connected as to allow air-drafts in every direction; and oftentimes the brick walls were what were called battened, allowing air-vents behind the plastering. Thus the house was on fire from top to bottom before it was known by the inmates that a fire had broken out, and the doors and windows in the surrounding walls allowed the admission of air to feed the flames. It was difficult, perhaps, to construct anything fireproof, but still it could be approximated to: it might, perhaps, be more costly so to build, but what was cost compared with loss of life? Speculating builders, however, would never adopt this manner of building, unless compelled by an Act of Parliament. With regard to the construction of warehouses, he did not think that anything would be effectual unless they were entirely constructed of brick, which would occupy too much room, and be exceedingly inconvenient. Therefore the only way was to confine them to a certain cubical content, as required by the present Act of Parliament. Another source of fires was using common flues for close fires: such flues were only enclosed by 4-inch brickwork, which was wholly inadequate. Another evil was using Welsh fire-lumps at the back of grates, which, if fixed close to the party-wall (especially in old houses, wherein timbers were almost invariably inserted), very often set fire to the adjoining houses.

Mr. J. W. Papworth assumed it would be agreed that what people called fireproof materials were literally the least protection in a great fire. Thus, stone staircases were likely to crack at the wall and fall, long before an equally solid wood staircase would be unsafe to the escaping occupier. Iron beams pulled the whole building down with them, whereas wooden beams, sadly charred, remained long after the engines had ceased working; and, in a great fire, even brick arches failed and fell. He admitted that very thick arches would stand a great heat; but the little things which were now called brick arches were impotent before even a moderate fire. A friend was saying last year, that he saw a brick-arched warehouse, belonging to his family at Liverpool, appear to melt down into the flames. Mr. Piper had observed that Yorkshire stone was exceedingly destructible by fire, and that, practically, it did not furnish a fireproof floor; but this did not appear to be Mr. Tite's opinion. And Mr. C. H. Smith considered that concrete, properly made, would bear a very considerable degree of heat, perhaps more than Yorkshire stone. Mr. Barrett had stated that, supposing any intense degree of heat to be generated, before it would act injuriously on iron and concrete, it would, probably, quite destroy a brick arch, either by disintegration, or by the arch's own expansion. Mr. Braidwood seemed to think that the only fireproof construction for large warehouses, where an intense degree of heat might be generated, was groined brick arching on brick piers. He (Mr. Papworth) accepted these discordant statements as evidence to one thing, viz. that none of them were fireproof in the ordinary sense of the word; and gave great credit to Mr. Braidwood for the distinction drawn between ordinarily fireproof, extraordinarily fireproof, and incombustible premises. The public had certainly been misled by the scientific acceptation of common terms. Fireproof did not mean incombustible, but only "not very likely to be totally destroyed by fire." Covering woodwork with metal was allowed by the insurance offices to be a prevention to a certain extent, that is to say, if a current of air passed between the hearth and the metal that touched the wood. A stone was equally a prevention under such circumstances, but he had seen a case where the hearth touched the stone: both the hearth and the stone had cracked—merely cracked—and the floor below took fire, with no current of air between the plate or stone and the hearth. By the late Building Act, any metal or other pipe or funnel for conveying smoke, heated air, or steam, ought not to have been placed nearer than 14 inches to any combustible material. But this had been constantly neglected; and in most cases the district surveyor had never known that work of the sort was being done; consequently, he could not be blamed for accidents. By the present Act, pipes for hot water must be 3 inches, for heated air or steam must be 6 inches, and for smoke or other products of combustion must be 9 inches from any combustible material; and no ventilation opening might be nearer than 12 inches to any combustible substance. Both Acts gave a penalty of 20*l.* if the work, although correctly done, had been executed without notice given to the

district surveyor; and the new Act added a penalty of 20*l.* a day after non-compliance in forty-eight hours with a notice from the district surveyor that he had discovered the fault. The new Act had provided against the future erection of such extensive buildings as Mr. Braidwood inveighed, very properly, against, under the name of Manchester or piece-goods warehouses; and now no warehouse or other building, wholly or in part for the purposes of trade or manufacture, was allowed to contain more than 216,000 cubic feet, which was quite large enough, for they would then be 100 feet by 40 feet by 50 feet, equal to five of the ordinary houses mentioned by Mr. Braidwood. In justice to a much-abused body of gentlemen, he must say, that architects, builders, and proprietors, did very frequently,—sometimes wilfully, sometimes ignorantly, sometimes carelessly,—defraud the district surveyor of his fee, by not giving him notice that work was to be done. On the other hand, the district surveyor trusted a good deal to the character of the tradesman employed, as well as to the good faith of the architect, if there was one concerned; but neither the district surveyor nor the master builder considered himself called upon to watch the action of the workmen, and it was here that the damage was done. Mr. Tite built a fire-proof Exchange with false windows in it: a bricklayer was engaged to build a flue, and made the wood frame of the sashes serve as one side of the flue, which took fire. Mr. Smirke built a wall across the roof of Covent-garden Theatre: *no one could tell who pulled it down, or when it disappeared.*

On the second evening, the secretary read a communication from Mr. Bridges Adams, which contained the following:—

"If the Legislature, deeming it right to guard human health from unwholesome buildings, as well as human life from dangerous buildings, should determine some day that all future buildings must be noncombustible, a great impulse will be given to the production of iron, brick, and stone, natural and artificial, and noncombustible buildings will come to be cheaper than combustible ones. They are, in fact, cheaper at present, if we take into account—insurance—doctors' bills—repairs—and inconveniences of all kinds; saying nothing of the process of being burned in bed, and the concomitant taxes for fire-escapes and other patch-work contrivances.

It is quite true that we cannot all at once get rid of our present dangerous buildings, but we can establish a principle, and, to a considerable extent, we can make it self-acting, by promoting the extension of non-combustible iron buildings in those situations where ground is costly, as in the City of London. For example;—Suppose a site 20 feet by 40 feet, and the four walls to be each 18 inches thick in brickwork, 20 per cent. of the area is lost, or about 170 feet out of 800 feet. If the walls be of double iron, and only 6 inches in thickness, the loss in area will be little over 6 per cent. or about 50 feet out of 800 feet, being a saving of 120 feet as compared with brick. If this be multiplied by five stories, we have a saving in space of 600 feet total, or nearly 67 square yards. When we think of the almost fabulous prices of City building sites, and multiply this result of one building by the whole of the buildings in the City, it is practically equivalent to the creation of so much new land 67 square yards on a base area of 89 yards.

This is a question very imperative for the consideration of the Metropolitan Board of Works, and the adoption of such a principle would give rise to new improvements in preserving iron from oxydation, and possibly to some new kind of compound metal, not subject to rust; at any rate, to a cheap and effective process of bituminising, as a substitute for the miserable wash of zinc called galvanising, which gradually disappears in a surface of red rust. The tin-plated roofs of Montreal and Quebec, flashing in the rays of the sun like a silver city of romance, are infinitely preferable to this. Tin is a metal not easily oxydised, and shelters the iron hermetically. Zinc being a metal easily oxydised, shelters the iron only by opposing its own substance to be devoured instead, as a kind of scapegoat. The oxydised zinc then rubs off, exposing a new surface, which is eaten in turn, till finally the iron is left exposed to the full action of the oxygen."

Professor Hosking, in a note to the secretary, referred to his book, written by him in 1847, entitled "Healthy Homes," and to an article in the *Encyclopædia Britannica*, on "Construction," written in 1854, as containing his views on the subject of Mr. Braidwood's paper. In this article a section is devoted to "Security of Buildings from Fire." The following passage explains how, in Mr. Hosking's opinion, dead heat may lead to the combustion of timber in buildings:—

"It is to be understood, at the same time, that a piece of wood will bear a powerful dead heat upon its sides for an indefinite period without igniting, unless a transverse section of the fibre, as at or around a live knot, or where a branch had been lopped, presents itself to the action. It is by the end that a piece of wood, exposed to powerful heat, most readily ignites. The gases evolved in the substance of the timber, by the action of heat applied to its surface, expanding as they are evolved, are thrown out by the pores among the fibres at their ends, if the ends are near enough to the action to allow of this effect, with less power than may be enough to obtain vent for the inflammable gases laterally."

Mr. Hosking added that, four years ago, he applied much of what he had advocated in respect of security from fire in buildings in a new compartment of Messrs. Clowes's printing-office, and that he is now applying the same system, more fully, perhaps, in Messrs. Berens and Co.'s large stack of buildings in Cannon-street.

In the course of the discussion, Mr. Baddeley, with reference to what Mr. Braidwood had stated, "that there appears to be some chemical action between heated iron and timber, by which fire is generated at a much lower temperature than is necessary to ignite timber under ordinary circumstances," said this fact was indisputable, but no satisfactory explanation of it had yet been given. The iron, chemically speaking, was by no means essential to the result, because it had been repeatedly observed that roasted bran, coffee, malt, and other vegetable substances, as well as coke, charcoal, and other matters, after being cooled down to such an extent as to be easily handled, had, when laid together in bulk, gradually increased in temperature, until they had eventually ignited. To this phenomenon he had given the name of the accumulative property of heat, but could offer no satisfactory explanation of its cause. Mr. Marrable, at the previous meeting, supposed that the timber was converted into "touch-wood" previous to ignition, but such was not the fact. The timber assimilated more to the character of charcoal, and ignition took place in these cases at a temperature much below the igniting point of either touch-wood or charcoal under ordinary circumstances. The greatest cause of fire was candles, upwards of 4,000 fires having been thus occasioned in London since 1832. But this might have been expected, seeing that candles were almost in universal employment. The next prolific cause of fire was flues, then gas, and under these three heads alone more than half the total number of fires would be found.

Mr. Robert Rawlinson remarked he felt satisfied that the water supply in London could be made as active as in Manchester or as in any lesser town. The question of extinction of fires was most important. It was one which, sooner or later, must engage the attention of the local governing bodies of the metropolis—and must involve an improved system of water supply. It appeared there was a dormant pressure of some 150 feet—that is, 150 feet head; but, by reason of friction and exhaustion, there was little or no active head. Water under the present system would not rise from the mains more than a few feet. It was a question well deserving consideration, as to whether some means could not be adopted to make the present mains answer the purposes required. "Head," or pressure, was lost by length of main, by bends, and by any obstruction causing friction. A length of parallel main might have 150 feet head at one end, and might only have a few feet of working or active pressure for fire purposes at the other end. By the erection of what he would call towers or reservoirs of equilibrium, a more even, regular, and effective pressure might be established. The capacities of pipes varied as the squares of their diameters, and their delivery about as the square root of the head, minus friction. Water would, under the most favourable circumstances, rise through the atmosphere in a jet to a height of about two-thirds the head; that is, from 135 feet head, a jet should rise 90 feet. Friction would reduce this. Mr. Beardmore, in his valuable hydraulic tables, detailed experiments with pipes under several conditions as to diameter, length of main, and head, giving the height of jet and volume of water discharged.

IN PRESTON,
From 6-inch main, head 110 feet.

	Height.	Discharge.
With 1 jet ¾ inch	57 feet	12·5 cubic feet.
„ 1 „	64 „	14·4 „

The first being during the day, the latter during the night.

IN LANCASTER,
From 8-inch main, head 225 feet.

With one jet an inch in diameter the water rose to a height of 140 feet.

With 100 feet of common hose of 3-inch diameter, the water rose to a height of 80 feet.

Before water could be available under pressure, there must be proper fire-cocks or hydrants. Force and volume of water might be obtained in the metropolis by a proper revision and improvement of the water mains and services.

Mr. Barrett observed, that Mr. Braidwood had stated in his paper, that *carefulness* was one of the best preservatives against fire, and no doubt he was right. He feared, however, that so long as we continued to construct the interiors of our houses of a material so inflammable as timber, so long should we have to regret the annual loss of a vast amount of property, and to deplore the still greater evil of a large destruction of human life. It was remarkable that with so subtle and insidious an enemy as fire to deal with, we should still continue to provide, in the construction of our buildings, that description of *food* which was best adapted to that enemy's devouring propensities. But so it was: we were wedded to custom, and it was exceedingly difficult to break through long-established habits. The construction of fire-proof buildings was a subject that had certainly not received that degree of attention which its importance merited. Until within a comparatively recent period, very little had been attempted in that way. Some few of our more important public buildings, some of the mansions of the nobility, occasionally a warehouse, and here and there a cotton, clothing, or silk mill, had been constructed upon a fire-proof principle, namely, that known as the iron girder and brick arch system; but this system was not adapted for domestic buildings, nor was it altogether free from objections. It had been well said that the arch *never sleeps*, it was always exerting a strain upon its supports, which required to be counteracted, and although it was customary to use tie or tension rods for the purpose of resisting this lateral strain, these rods were not always employed, nor when employed were they always successful, and occasionally accidents of a most serious nature had occurred in buildings constructed upon this plan. He could instance many of these, but would refer to only one, that of a large mill in the north of England, consisting of five stories. One of the arches in the upper floor of this building had settled, or sunk, and it became necessary to reconstruct it. In doing this, sufficient care had not been taken to strut or keep apart the girders upon which the arch was supported. They, in consequence, yielded to the lateral pressure of the adjoining arches, and the whole range of girders and arches gave way, and fell to the floor below. This floor also yielded to the mass of materials thus suddenly thrown upon it, and so on, in succession, every floor gave way, the entire building becoming almost instantaneously a mass of ruins, and killing twenty persons in its fall. This method of construction could not, therefore, be looked upon as free from objection, nor was it generally applicable. What was really wanted, he apprehended to be this—a method of construction that for all ordinary purposes should be practically fire-proof; one that should combine great *simplicity* of construction with *economy*, so as not to exceed, in any great degree, the cost of a building as generally constructed; and one that should at the same time be applicable to all descriptions of buildings, particularly to those of a domestic character. The system of fire-proof construction, which he had been for many years engaged in carrying out, he believed fulfilled all these conditions or requirements.

HOUSE DECORATIONS IN ENGLAND.

THE TAPESTRIES AND WALL PAINTINGS OF THE TIME OF HENRY THE EIGHTH, QUEEN ELIZABETH, &c.

It is known that many of the tapestries and hangings of the interiors of English houses were manufactured in Spitalfields and the adjoining neighbourhood, even before the settlement of the French refugees in that district. At an ancient date the weavers formed one of the important City companies: indeed, it is asserted by some London historians, that this was the first incorporated society in the city of London. In the reign of Henry I. they paid 16*l.* to the Crown for their immunities, and eighteen marks annually. King John, in the year 1200, disfranchised them at the instance of the mayor and citizens of London; for which *favour* (as it is called) the citizens paid the king twenty marks per annum. This difference between the citizens and weavers probably arose from some bad practices of the latter, who, by virtue of a power granted by Henry II. in the thirty-first year of his reign, were put under the inspection of the chief magistrate of London; for, amongst other articles, the king ordained, "if any man made cloth of Spanish wool mixed with English wool, the portgrave, or chief magistrate, ought to burn it."*

In the seventh year of Henry IV. this company, which originally consisted of tapestry and cloth weavers, were reinstated with their freedom, and, by Act of Parliament, put under the management and authority of the Lord Mayor and aldermen of the City. The craft of the London weavers has now, however, been changed, by the discontinuance of the use of tapestry; and their skill is confined mainly to the manufacture of silk and velvets.†

Some opinion of the exquisite richness of the ancient works in cloth may be formed by an examination of the palls still preserved by several of the City companies, some of which were exhibited at the Society of Arts, and, together with other matters, displaying the skill of the Middle Ages. Some of these are of elaborate pattern, and composed of valuable materials.

In the fifteenth century, during the great festivals, the interior of the church of St. Jacques de la Boucherie, at Paris, the tower of which has been lately restored, was ornamented by a carpet representing scenes from the romance of "The Rose," and by another called "The Love of God and Old Age." On Christmas-day and other feasts, the subjects were changed.

In Hampton Court some of the tapestry was ancient, but very rich, the lights being all gold and the shadows of different coloured silk: here some of the tapestry represents Hercules and the Hydra, the story of Abraham, the Children carrying the Twelve Stones to the River Jordan, and also some subject illustrating English battles.

A century ago Windsor Castle was furnished with a considerable quantity of tapestry and other hand-wrought woven hangings. In the great dining-room the subject of the tapestry was the history of Hero and Leander. Some of the beds were hung with chintz, and the tapestry wrought in gold and silver. In the queen's presence-chamber the tapestry represented the history of the beheading of St. Paul and the persecution of the early Christians: the design and colouring of the tapestry were in this instance distributed over the roof by paintings of the figure of Queen Catherine attended by Religion, Prudence, and Fortitude, under a curtain spread by Time and supported by zephyrs, with figures sounding the happiness of Britain. Below, Justice was shown driving away Sedition, Envy, &c.; there were also some oil paintings in this room. In the queen's audience-chamber the ceiling was also decorated with allegorical figures. There was a canopy of fine English velvet set up by Queen Anne. The tapestry was made in Coblentz, in Germany, and presented to Henry VIII. For some of the other apartments the tapestry was procured by Charles II. from Brussels. A fashionable design at this time seems to have been the seasons of the year. Blue cloth embroidered with gold and silver was also much in use at this time; also green velvet embroidered with gold. In the queen's bed-chamber was a bed of state in rich flowered velvet, made at Spitalfields in the reign of Queen Anne. At about this time bed-chambers were hung with tapestry made in Spitalfields, of such subjects as "The Hay Harvest," Dutch wakes, &c.: the beds were hung with yellow and other coloured damask, and here and there were pictures of fruit, flowers, and such like subjects. An artist called Poyntz also executed tapestries of harvest fields, &c. at Spitalfields.

Wall painting in distemper had to a certain extent been a means of adorning English dwellings, but about the reign of Henry VIII. pictures of a more substantial kind began to form a feature in the decoration of domestic edifices. The works of Holbein,—such as the picture representing the granting of the charter to the Barber Surgeons, &c.—are well known. The famous picture of the meeting of Henry VIII. with Francis I. at the "Field of the Cloth of Gold," is such an important feature in the history of English art that it must not be passed over without notice. This picture, which possesses much merit, and is evidently a faithful representation of that important event, was at one time supposed to have been the work of Holbein, but although the portraits are all well executed, it is evidently the work of some other painter. On the occasion of this royal visit, Edward Hall, the recorder of London, was ordered by Henry VIII. to proceed to France and chronicle the event: from this account we gather some notion of the extravagant extent of the decorations in use at that period.

About the year 1459, one Sir John Fastolfe died, and the inventory of his goods gives us a great insight into the house furnishing of that time. This curious document is published in the *Archæologia*.

At a short distance east of Greenwich Hospital, stood, until within a short time, a characteristic specimen of the so-called Elizabethan domestic architecture. This house, with its "bow" windows quaintly glazed, the carved brackets, cornices, and other devices, had a pleasant look from the Thames, and led the thoughts of many to those bygone days when "Queen Bess" kept court at Christmas and other times in the palace of older date than the present. The interior of this house had been little interfered with: the staircase was of good proportion, and richly adorned with varied ornamentation of the time. There was, as is the case of the houses of this period generally, a judicious arrangement for lighting, which at most parts of the day caused broad lights or shadows. The walls were partly panelled, and unfortunately the rich-coloured oak was painted white: the dining-room, which, by its peculiar proportions, looked longer than it actually was, lighted by the bow-windows towards the Thames, was hung with tapestry of very choice colour and design. The mantelpiece was handsome, and the tapestry, without any addition of pictures, common trophies of the chase, or other matters, was quite sufficient to take away from any idea of bareness, or want of furnishing. The general colour of the tapestry was a deep greenish grey: the forest trees, reaching from the floor to the ceiling, were boldly drawn. Here and there were subdued tints of sky, hunters, and dogs; silver grey colours, on branches and varieties of foreground, and borders of scroll-work. The ceiling had been gilt, and delicately emblazoned; the windows, no doubt, partly filled with coloured glass. The modern Turkey carpet was a great improvement upon the rush-covered floors of other times; and the room, when we saw it, notwithstanding the introduction of some modern furniture, presented a picture of rare harmony. Some of the other rooms in this old house were also hung with tapestry, equally interesting. It was with regret when we went past one day, and found the bow-window, carvings, and tapestry all gone.

There are still some very large and elaborately-wrought tapestries hanging on the walls of the Governors' Room in the Charter-house. One of these shows the visit of the Queen of Sheba to Solomon. The grouping of this is excellent. The figure of the queen bears a strong resemblance to Mary Stuart, and observers of these matters suggest that King Solomon was intended to represent the unfortunate Howard, who came to his end in consequence of his attachment to the cause of the Queen of Scotland. The mantel-piece in this room is of great size, and elaborately wrought into panels, which are finely painted with various subjects.

About 1666, the famous Gobelin tapestry was established, under the protection of the French Government. Designs were prepared for these works by Raffaelle, and other Italian artists.

Portraits, generally of large size, and paintings, soon after the reign of Queen Elizabeth, began to displace the wrought hangings, and we find them in such places as the Guard-room of Lambeth Palace, hung side by side, in carved gilt frames, above the wood panelling, relieved by a stone-coloured tint.

After the disuse, in a great measure, of tapestry, distemper and other paintings came much into use, and had, no doubt, to a certain extent, a good effect on English art and taste.

The old apartments, staircase, and entrance-hall of the old British Museum were characteristic examples of the art decoration of several noble houses erected in England during the reigns of William III. and Queen Anne, and which consisted of paintings in dead colour, of subjects from the heathen mythology, Roman history, architectural devices, &c. many of which were also executed under the direction of Sir James Thornhill. The smoky atmosphere of London was sadly against this kind of ornament, which soon became dingy and indistinct. Many of our readers will remember the staircase of Montague House, when time, had turned the wall pictures to a dirty brown colour, which harmonized with the two decayed and shabby-looking giraffes which used to stand there. So indistinct had these works of art become, that it needed sharp eyes to discover that the paintings at the sides represented Cæsar and his military retinue, the chiefs of the provinces he had in part subdued attending upon him, and others on their knees imploring his assistance and protection. In one compartment were the feasts and sacrifices of Bacchus. In another, the rivers Nile and Tiber were represented by gigantic figures, emblematically ornamented, thrown out by a background of landscapes and pieces of classic architecture. On the ceiling were represented Phaeton, Phœbus, Diana, Juno, and other figures.

Further on Phaeton was shown driving the sun's chariot, accompanied by the hours in the form of women. Time was represented by Saturn; Eternity, by a female figure holding a serpent, near whom was Cybele, the goddess of the earth.

After the time of Queen Anne and George I. wall-hangings went out of use; and, amongst the wealthy, engraved prints and pictures served to some extent to supply their place. The effect of the distribution of engraved prints was of so much importance to English art and English house-furnishing, that we will reserve the subject for another paper, and meanwhile observe that about forty years since the houses of the traders and middle classes, particularly in the provinces, were chiefly coloured with simple washings of rose pink, whitening, &c. sized. Many of our readers will remember the whitewash mania which periodically seized the *woman kind* (as Mr. Oldbuck calls them): those of experience knew by certain hints when these vigorous operations were likely to take place, and endeavoured without effect to put off the day when the house would be upset from top to bottom.

At this time, in the houses inhabited by the class to whom we have referred, the pictures were of a very inferior description, consisting very often of rude sporting subjects, and coloured and plain engravings of battles by sea and land. In the dwellings of those not particularly tasteful, common prints were often framed by a sort of margin of the list torn off the edges of woollen cloth tacked to the walls. There were some pictures at this time, and for several years afterwards, greatly in use, and which were very showy, and in some cases very

* The dread of the importation into London of foreign labourers, manufacturers, and raw materials, expressed in the olden times, seems extraordinary at the present day.

† Some particulars of the Spitalfields weavers will be found in a previous volume of the *Builder*.

harmonious in colour. These often consisted of Scripture subjects, naval and military trophies supported by Nelson and Wellington, and an eruption of Mount Vesuvius. These are still to be met with in many houses, particularly in the country. These pictures, generally framed in black, were produced by transferring an impression from a copper plate on thin thin paper to glass plates, in the same way as designs are transferred to pottery. The outline and shadowing of the print is soon dried upon the glass, and then the colours mixed with oil or varnish are laid in their proper places. The great bulk of coloured prints at present in use are very indifferent.

INFORMATION FOR ENGINEERS.*

ONE day, some eighteen or twenty years ago, the singular spectacle might be seen by the inhabitants of a certain inland town, of a ship progressing through the streets towards its own proper element. What combination of resources was required to get the novel freight to the nearest water-way; or how then to pass it over weirs, or through locks planned with reference to canal-boats, and to launch the vessel unstrained, in the Irish Channel, we are now unable to call to mind. The story, however, would mark the character of one of those tentative efforts which Mr. Fairbairn was making at Manchester, and which were consummated at his works at Millwall, in the construction of sea-going vessels of a class involving the largest dimensions,—the largest, at least, until, on the site of other achievements, rose the frame of a ship more gigantic than the works in naval architecture of the Egyptians,—indeed, a future very "Triton among the minnows." From the iron canal-boats that one used somewhat to wonder at, in the youth of our, and the country's, naval experience, down to the last forging link in this iron chain, how wonderful is not merely the material result, but the debt which is illustrated as due to science? Mr. Fairbairn *had* need to advocate the value of abstract science and theory,—for the hearing of a country or a government which leaves the investigations to the accidental conjunction of pecuniary means and inquiring spirit; but he had none, for the information of his northern *compatriotes*, to whom his own practical illustrations of the truth which he advances, are known in many departments of engineering construction touched upon in his lectures, other than iron-ship building. The experiments on hot and cold-blast iron; those of Mr. Hodgkinson, which determined the best form of section for iron beams; and others which extended our knowledge of the properties of materials,—not to mention what is due to Mr. Fairbairn in relation to the tubular-bridges and the available resources of wrought-iron rivetted girders,—are some of the things which are scarcely referred to in the volume before us, but of which the results could be quoted in aid of his argument.

The bulk of the work we are noticing, however, gives practical information on *several* subjects, in which the author's experience is of value. There is a little want of order and sequence as the subjects stand in the book itself,—perhaps resulting from the original arrangement for lectures. But matter is there, as interesting to architects as to mechanical engineers; and there will be no imputation on the score of putting it forward as "useful information." It is valuable occasionally in these days, to get *words* from him who has known something of *acts*.

The "lectures" relate primarily to the construction of boilers and to boiler explosions, as well as to the properties of steam; and also treat of the consumption and economy of fuel, and prevention of smoke, and of iron shipbuilding; and one lecture is "on the necessity of incorporating with the practice of the mechanical and industrial arts a knowledge of practical science," wherein the author adds his testimony as to the contrast which there still is between the educational institutions of other countries (such as the "Conservatoire des Arts et Métiers" at Paris) and those of this country; and wherein he gives a lucid sketch of the comparative state of the manufacturing industry of Lancashire during the last and present centuries, and shows that other branches of industry have increased in a ratio similar to the increase in the cotton manufacture. In England and Scotland generally, the weekly consumption of cotton is not under 31,500 bales. There are spun 50,000,000 miles of yarn per day, a length sufficient to circumscribe the globe two thousand times: and there are woven by 250,000 power-looms, 3,551 miles of cloth per day, equal to the distance between Liverpool and New York,—or forming an annual produce of cloth that would extend over a surface in a direct line, of 1,000,000 miles. On the score of love of nature and art, and some feeling about the gain derivable from these things also, we may be excused for a word of regret for "the secluded valleys, farmhouses, and neat cottages, the beauties of a Lancashire landscape of the last generation." Yet, we not only admit that the national prosperity is associated with facts as chiefly exemplified in a certain district: but *we* must necessarily feel interested in these facts,—dependant as is our own art upon the success of commerce. Such prosperity, however, is endangered by any character of attention to science not parallel with what obtains elsewhere. The great production and consumption above indicated, results from the fact of demand by the markets of the world; and the possession of these markets is precisely for those who can supply them in the best and cheapest manner. There may be nothing new in what we here state. But the conclusion requires to be acted upon. The value of abstract science, and of what is far too often depreciated as "theory," must be felt. Present wealth, and bull-headed strength can do much for the country; but there are resources of a more valuable description. Our professions require better educational systems. Our handicraftsmen would do their work all the better for some little insight into the *rationale* of their occupations. Do the ordinary building artizans achieve simple manual skill? Do bricklayers usually know how to lay bricks? Do house-painters, as a matter of course, know how to mix and lay colours. Mr. Fairbairn says,—

> "In my opinion, every one should be taught the rudiments and higher branches of their professions upon the same principles as barristers or physicians are taught,—and with this difference only, that no man should be ineligible to practise his profession whenever he finds himself competent to the discharge of its duties;—any enactment to the contrary would militate against the freedom of labour and the employment of capital, and if carried out, would paralyse the best interests of a manufacturing and commercial community."

The reference to the "Conservatoire," at Paris, and its school for persons destined to follow industrial occupations, came home to us in our special field. Amongst the subjects of instruction there are,—"Arithmetic, elementary geography, weights and measures, statics, descriptive geometry, stone-cutting, carpentry, cabinet-makers' work, perspective, mechanics, transmission of motion, hydro-dynamics, including descriptions of instruments of all kinds; designing—plain and ornamental; machinery, and architecture." But, besides this school, used by 300 students, there is another for similar objects, entitled "Ecole Centrale des Arts et Manufactures;" and hence, as Mr. Fairbairn remarks, "arises the superior knowledge" which in France "is brought to bear upon the useful arts."

Mr. Fairbairn has entered into the subject of the nature and properties of steam and other elastic fluids at considerable length; and he sets forth Mr. Joule's new theory of heat, with the nature of other investigations, as those of Regnault on saturated steam, which he says are likely to produce "important changes in the theory and construction of the steam-engine, as well as in the mechanical application of other elastic fluids." Such improvements have reference to the use of high-pressure steam in improved engines, "probably working from 150 to 200 lbs. on the square inch."

With regard to the construction of boilers: he gives rules for calculating the strength of cylindrical boilers, and particulars as to other forms. From the results of experiments to determine the effects of temperature, he infers "that the infusion of heat into metallic substances, such as cast and wrought iron, does not produce any serious diminution of their strength up to a temperature of 600 degrees." It is true, as stated by Mr. Braidwood, in his excellent paper,* that Mr. Fairbairn found a considerable diminution of strength up to a certain degree of heat in the more fluid or finer descriptions of iron; but in the harder and stronger descriptions, "there was nearly the same increase of strength up to 600 degrees."

The effect of rivets, Mr. Fairbairn some six years ago, demonstrated was to weaken the plates,—though the double rivetting is stronger than the single. Thus:—

Assuming the strength of the plate to be...	100
The strength of a double-rivetted joint would be, after allowing for the adhesion of the surfaces of the plate.....	70
And the strength of a single-rivetted joint	56

It had been contended by many boiler-makers that the rivetted joint was necessarily stronger than the plate.

Respecting the forms of boilers, he says that the haycock, hemispherical, and waggon shapes, should be "entirely exploded,"—since "they are all bad as respects their powers of resistance." The cylindrical form with hemispherical ends, is best for strength: but there are particular advantages in favour of the cylindrical form with two internal flues. The latter form also is recommended, because it admits of alternate firing, which itself is advantageous in regard to perfect combustion and diminution of smoke. In this form, flat ends will be necessary; and these should be stiffened by gusset pieces, internally, in preference to stay bars.

If boilers were properly constructed, there would be no difficulty, and much greater economy, in employing a pressure of steam, greatly exceeding that of 5 to 20 lbs. on the square inch as adopted in manufactories. This leads to the consideration of the causes of explosions. It is to be regretted that the evidence in such cases is necessarily defective. Still it appears to Mr. Fairbairn, that many of the explanations which have been lately given, are without foundation. He classes the causes of explosions under the following heads:—

1st. Boiler explosions arising from accumulated internal pressure.
2nd. Explosions from deficiency of water.
3rd. Explosions produced from collapse.
4th. Explosions from defective construction.
5th. Explosions arising from mismanagement or ignorance.

It is clear, however, that the last head would include the chief of the others; whilst there is a cause mentioned by the author, to which considerable importance should be attached, namely, incrustation of the boiler. Incrustation, as from salt-water, is not only a serious inconvenience as regards the duration of the boiler and the economy of fuel, but it is otherwise dangerous. The deposit being an imperfect conductor, the metal may become heated even to a red-heat; and the difference of expansibility between the two substances may then lead to a separation; when the water rushing to fill the interval would generate a large quantity of highly elastic steam, and thus endanger the security of the boiler. Culpable neglect, however, appears to be the most fertile cause; for, as Mr. Fairbairn says:—

"In nine cases out of ten, a continuous increasing pressure of steam, without the means of escape, is probably the immediate cause of explosion; in some instances it arises from deficiency of water; but accidents of this kind are comparatively few in number, as we often find, in tracing the causes, that they have their origin in undue pressure, emanating from progressive accumulation of steam of great pressure and density." The construction and efficiency of the safety-valve are therefore of the greatest importance. Mr. Fairbairn has figured a form of the apparatus, which could not easily be tampered with. But the super-

* Useful Information for Engineers; being a Series of Lectures delivered to the Working Engineers of Yorkshire and Lancashire; together with a Series of Appendices, containing the results of experimental inquiries into the strength of materials, the causes of boiler explosions, &c. By William Fairbairn, F.R.S. F.G.S. &c. London: Longman and Co.

* See p. 259, *ante*.

vision of none other than a properly trained and steady engineer is indispensable. The opinion that explosions occur from the production of *hydrogen gas*, our author believes to be erroneous. Gas indeed might be produced by the sudden introduction of a small quantity of pure water, in the case of a new boiler; but explosion would not even then occur without the presence of atmospheric air or oxygen, and of flame or a substance heated to a very high degree. Mr. Fairbairn concludes, that "we have no foundation for such a theory, nor have we the least shadow of evidence to prove the presence of hydrogen gas in a boiler." The sudden introduction of water upon incandescent plates is, however, dangerous, from the generation of highly elastic steam; and it may be doubted whether the ordinary safety-valves are fully adequate to its escape. The danger of explosions (if they may be so called) from collapse, appears to be chiefly involved in the use of the internal flues.

It is clear from Mr. Fairbairn's statements, that boiler-explosions, which are now so frequent, might generally be prevented. In the Manchester district there is an association for the prevention of such explosions, and for effecting economy in the raising and use of steam. Inspectors are appointed, and the *results* of the examinations are preserved.

Mr. Fairbairn's lectures on the consumption of fuel, concentration of heat, and prevention of smoke are interesting as the observations of one to whose particular professional qualifications is added the results derived from the experiments of Mr. Henry Houldsworth at Manchester, and others. In the procurement and employment of heat, there have to be considered:—

1st. The quality and properties of the fuel used.

2nd. Its treatment in the furnace, and the supply of air requisite for its combustion.

3rd. The form of boilers, and the extent of their absorbent surfaces.

4th. The concentration and economy of heat.

And, lastly, the prevention of smoke.

On all these points the author's suggestions may be perused with advantage,—though, as to prevention of smoke, after all, the opinion that more depends upon the manner of firing, than upon mere proportion of openings and grate-bars, receives corroboration.

Mr. Fairbairn, as might be expected, is an advocate for the advantages of iron as a material for ship-building, especially in regard to its greater security and durability. Indeed, though unable to rebut the evidence of the experiments as to the effect of shot upon ordinary metal plates, he seems quite indisposed to consider the results as ultimate. We find no reference to the recently constructed mortar-vessels, in which thicker plates were employed. The apprehension about oxidation, he says, has been greatly exaggerated; "for it is with iron ships, as with iron rails; when in constant use, there is little, if any appearance of oxidation." The point as to tubular bridges we do not find noticed.

It is to be regretted that some few of the tables will be at first rather puzzling to readers,—on account of errors of the press. Where tens of thousands of pounds are intended, the insertion of a decimal point makes the numbers read as tens; and in the table of Rondolet and Hodgkinson's results, a 0, moreover, is omitted, for the bewilderment of the previously not too well informed reader. But where similar figures appear in the appendix, they are given correctly.

At the end of the book are a number of useful appendices, partly reprinted from Mr. Fairbairn's papers, in the "Philosophical Transactions," and which refer to the strength of wrought-iron plates, to that of plates rivetted, to the strength of locomotive and other boilers; to particular explosions, and the means of prevention; and which contain also reports relative to the smoke nuisance, and other subjects. There are also *formulæ* for calculating the strength of plate girders, which Mr. Tate has contributed.

The work leads us to hope that extended results of Mr. Fairbairn's varied and great experience may one day be given to the world. We cordially recommend the book as instructive and valuable to a far larger class than that for the benefit of which the lectures were prepared. It is a significant fact, and one worthy of the consideration of all interested in the success of London institutions, that these lectures could be given to popular audiences.

CHURCH-BUILDING NEWS.

Peterborough.—We are asked to make it clear that the architect, under whose superintendence the new church here is being carried out, is Mr. E. Ellis, of London, while the builders are Messrs. Ellis and Son, of Peterborough.

Lincoln.—The erection, in the new cemetery, of a public monument to the officers and private soldiers of Lincolnshire who fell in the late war, is suggested in the local *Chronicle*.

Lynn.—The consecration of the new cemetery took place on Monday before last. The grounds have been laid out so as to form a promenade for the inhabitants of the town. The two chapels, connected by an archway supporting a spire; the curator's house and offices, and the reception-house for bodies, are all in the Gothic style, faced with flints and dressed with stone.

Pyrton.—The parish church of Pyrton, Oxfordshire, which has been rebuilt and enlarged, was consecrated on 24th ult. by the bishop of the diocese. The building is faced with grey flint, hammered and laid in courses, and has frequent buttresses, free-stone ashen-work, and decorated windows, high-pitched roof of stained tiles, and a bell-turret rising 8 feet, and carrying three old bells. The architect was Mr. J. H. Buckler, of Oxford. The old porch—drawn in "Skelton's Oxfordshire"—through which John Hampden and his bride, Elizabeth Symeon, of Pyrton Manor-house, passed to the altar—still stands, and is refaced with flint: all else is entirely rebuilt; but the Norman doorway and Norman chancel-arch, with the two Norman windows in the chancel, have been re-erected. The deal roof has principals every 6 feet boarded and stained. The seats, all open, and so far copies from the old ones, are of oak, with some open carved work in the chancel. The aisles are floored with Minton's red and black tiles. The stoves are underground. The church will hold 300, nearly double the old church. It has been rebuilt—the nave at a cost of nearly 1,450*l.* The chancel has been rebuilt at a cost of above 400*l.* borne jointly by the dean and chapter of Christ Church, Oxford, and the earl of Macclesfield, their lessee.

Bucknell (*Oxon*).—The chancel of this well-known Early English church has just undergone a renovation, under Mr. White, and the windows have been filled with glass quarries by Mr. Lavers, from the designs of the architect. The builders employed were Messrs. Coney. The nave, also, has undergone repair, under the direction of the *churchwardens*, who have taken off the plastering, and replaced it with "stucco, jointed like stone."

Shepton Mallet.—The consecration of the Shepton Mallet cemetery took place on Monday before last. The cemetery is situate in Cow-street, and comprises about four acres. It is surrounded by a stone wall, and an iron-wire fence divides the part allotted for the use of the church from that of the Dissenters. The entrance is from the new road. There are two chapels built alike, from designs by Messrs. Wainwrights and Heard. The contractors were Messrs. Fudge and Gould. The cemetery was opened for interment on the 1st of June.

Edgbaston (*Birmingham*).—A vestry meeting of the parishioners of Edgbaston was held on Thursday before last, to take steps for the enlargement of the parish church. Mr. J. F. Ledsam, proposed, as an amendment, that it would be preferable to erect an additional church in the parish. This amendment, however, not being approved of by the meeting, the necessary resolutions for the enlargement of the existing church were carried. It is proposed to erect an additional aisle on the side of the church nearest to the park. Plans and specifications have been prepared by Mr. Fiddian, the architect, and the work will be commenced without delay. A considerable portion of the necessary expense has been already raised by voluntary subscriptions.

Rushall.—The re-opening of Rushall Church, near Walsall, took place on Thursday in week before last. The old building has been entirely taken down except the tower, and a new church, much larger, has been erected on the site. The present edifice consists of a nave, 53 feet long, and 24 feet wide, with a height to the summit of the open roof of 39 feet. Including the chancel (21 feet) and the tower, the total length, from east to west, is 95 feet. The old church had only one transept, to the south. Another has been added, to the north, giving the church the form of a cross, the extreme width across the transepts being 65 feet. The building is in the early English style. The exterior is of limestone with dressings of Hollington stone. The interior is fitted up with framed seats of deal, varnished. The edifice has been erected from designs by Mr. James Cranston, of Birmingham, architect, by Mr. I. Highway, of Walsall, builder. The building will seat 413 persons, and half the sittings are free. The funds have been furnished by voluntary contributions. The total cost will amount to about 1,600*l.* Mr. Highway, the contractor, added a stone plinth, not in his contract, as a gift to the church.

Rawtenstall (*Manchester*).—Some fifteen years ago, a Methodist chapel was erected in this village, with sittings to accommodate 1,200 persons, at a cost of from four to five thousand pounds; but sectional differences having arisen amongst that body, "the Old Wesleyan Methodists," there have been erected here since, places of worship for the Association Methodists, Primitive Methodists, Unitarians, and the Church of England; and on 16th ultimo, the foundation-stone for a new "Methodist Free Church," was laid by Mrs. D. Whitehead. The building is to be 78 feet long by 54 feet wide, exclusive of the portico, and in the Corinthian style of architecture, from stone procured in the neighbourhood. Mr. Robinson, of this place, is the architect; and Mr. Walter Sidley, of Ashton-under-Line, is the contractor for the whole of the works (exclusive of the painting, ironwork, gas-fittings, and heating apparatus), for the sum of 3,900*l.*

Burnley.—The cemetery for Burnley was consecrated on Saturday before last. The whole area of the ground purchased by the local commissioners is 18 acres; but the portion at present enclosed is 12 acres. The ground is divided into three allotments—6 acres being allowed to the Church of England, 4 acres to the Dissenters, and 2 acres to the Roman Catholics. On each of these plots there is a chapel. The architect was Mr. Thomas Worthington, of Manchester. The grounds are being laid out, and the plants and shrubs supplied by Mr. Stansfield, of Todmorden; and the whole of the works have been under the superintendence of Mr. J. Brierley, surveyor to the commissioners. The grounds were to be opened for interment on 1st inst.

Leeds.—The lower portion of the great west window of the parish church is being fitted with stained glass, by Mr. Evans, of Shrewsbury, who about fifteen years since supplied the stained glass of the upper portion of the same window. There are six openings in the window, and the two centres are occupied with two groups,—the baptism of our Saviour, and Christ blessing little children.

Sheffield.—The foundation stone of a new church at Belfield has been laid. The site of the new church (St. Stephen's) is on an eminence a few yards from Belfield House. The general form of the edifice is that of a cross (without aisles), with central tower, 24 feet square, and 80 feet in height. The style is early decorated English. The length internally, from east to west, will be 95 feet, and the breadth across the transepts 68 feet 6 inches. The contractor for the masonry is Mr. James Powell; for carpentry, Messrs. Dutton and Heald: the architects are Messrs. Flockton and Son. There will be accommodation for about 500 adults and 150 children. The whole expenditure will be met by Mr. Henry Wilson, of Westbrooke, snuff manufacturer. The entire cost of land and building is estimated at upwards of 4,000*l.*

THE NEW DISTRICT CHURCH OF ST. ANDREW, LAMBETH.

THIS church is arranged with a nave and north and south aisle, a ritual chancel extending to the second bay of the arcading, and a tower at the west end of the north aisle.

Its construction is of brick, both externally and internally. The exterior is built with common grey stock bricks, with bands of grey-stone: the jambs of windows and doors, and the discharging arches, are also all of bricks, the arches being set with alternated voussoirs of red and grey brick, and the stone window-frames and tracery standing in a deep reveal: the gables have their raking sides constructed in dovetailings instead of horizontal courses, thus (A); the tympanums being occupied with circles and reversed triangles (B), constructionally formed with red bricks. The tower, which is gabled on its four sides, has each tympanum also occupied by three circles and triangles, with cinque foliated lights, also in red bricks. From the apices of these gables rises an octangular timber spire; the exterior covering of which is of slate, in two colours, laid in bands, and other pattern.

The interior (independent of the shafts of the arcading) is of brick, in two colours, constructionally arranged. The general colour is that of the white Suffolk brick, diapered or banded, and otherwise varied with red. The general walls are banded with two courses of red to five of white. The spandrils of the arches have circles and reversed triangles in red. The chancel is worked in a diapered pattern, thus (C), with the voussoirs of the window arches alternately red and white.

The parclose, dividing off the vestry at the east end of the north aisle, is of brick, in two colours, terminating in a tracery of brick and brick cornice. The reredos consists of an arcade of seven trefoil-headed arches, constructed of brick, resting upon shafts of lizard serpentine, with carved caps and bases of stone. The spandrils have carved medallions in circles of brick. Above is a horizontal band of encaustic work, capped with a brick cornice, and stone coping. The arcading will contain the Decalogue, &c. inscribed upon rolls of tin. The bricks adopted are red, and black, and a few white.

The font is banded with encaustic work.

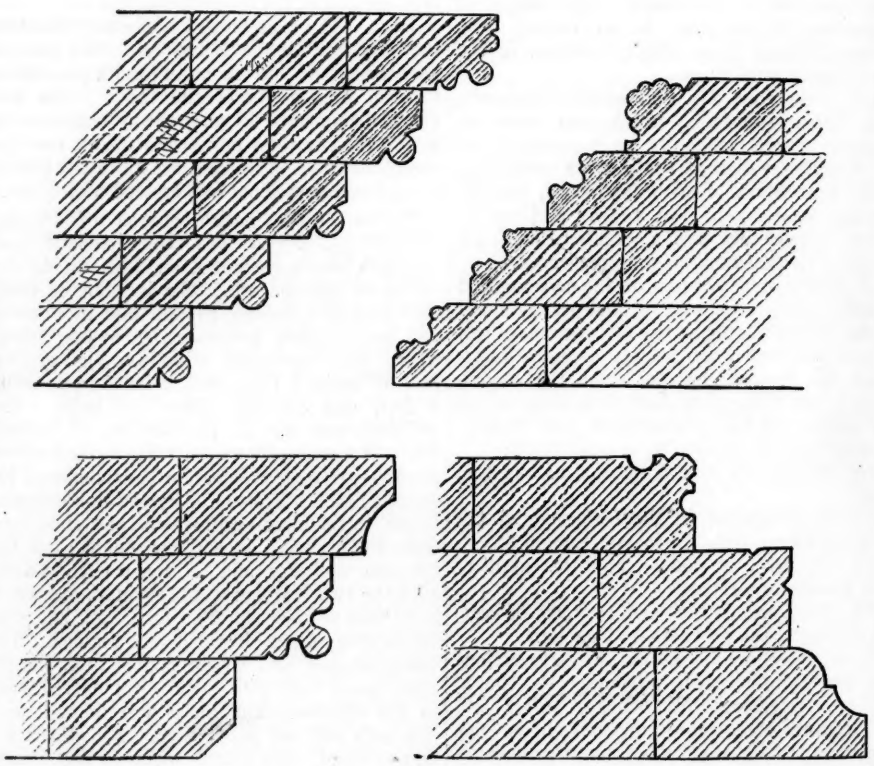
The object of this construction has been reality of application of material in constructive decoration. Its cost, independent of galleries (which are designed to be chiefly of iron, with a screen-work of floriated wrought-iron, by Skidmore, and spiral staircases of similar design), is 5,600*l.*; and it will accommodate, with the galleries, 1,100 persons. Its total cost (independent of gas and stoves) is 5,989*l.* The height of the spire is 150 feet. Mr. S. S. Teulon is the architect.

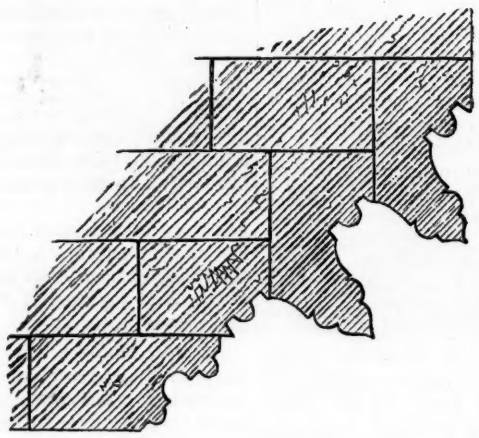
The annexed sections of brick mouldings from churches in Germany, are from the First Quarterly Report for 1855-6 of the Incorporated Society for Promoting the Building, &c. of Churches and Chapels, which also contains, as do previous reports, some observations on the use of brick in churches.*

BRICK ARCHITECTURE.

A. B. C.

Details: St. Andrew's, Lambeth.





Brick Mouldings, from Churches in Germany.

THE ILLUMINATIONS.

THERE are few days of national commemoration in England. The retention of two of the number—the 5th of November, and the 29th of May—is not due to grateful regard for the memory of certain kings of the house of Stuart. The annual ovation in fireworks, and the suspension of the leafy oak-bough, like some other customs, have survived the original significance. This year, however, the coruscations of gunpowder, and the festival of a 29th of May, were united in celebration of another starting-point, which the Royal Academy have well chosen to hail on their catalogue, as auspicious for artists. Soon may we write—

"Rich industry sits smiling on the plains,
Though "PEACE and plenty" may not tell
"A *Stuart* reigns."

For our own art, the value of international peace is obvious, spite of the inference which might otherwise be drawn from the history of certain countries, as history is written. Not long ago, we compared the appearance of London during the war with France, with its altered condition some few years after; and whether the progress during forty years has been worthy of the nation, or not, it may be noted that some of the chief undertakings in London street architecture date from the close of a long and costly war. In one respect forty years have not been misused; and in the knowledge of styles of architecture and principles, our architects surely are able to begin the peaceful victories of 1856, and leave a monumental London to mark the present reign, as the literature of the poet's day does the name of the "Stuart" queen.

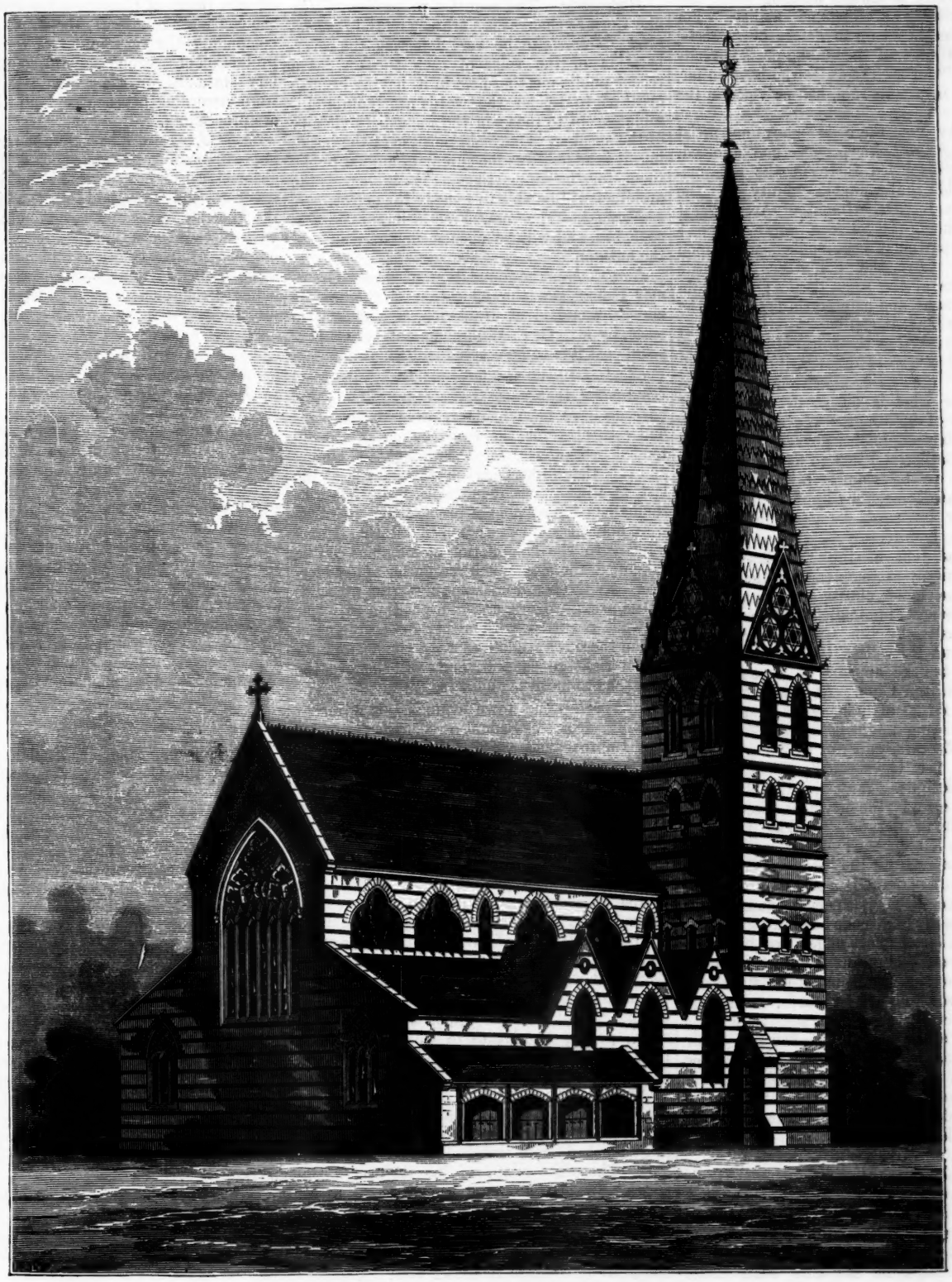
What architecture now lacks is not so much professional skill, as discerning and discriminating patronage,—not patronage of the eleemosynary sort,—but that rarest of all things, the ability in those called *employers*

* The last report of the society states, "that in the year ending 31st March, 1856, the number of grants made was 100, viz.:—

For building churches	27
„ Rebuilding ditto	16
„ Enlarging, &c. ditto	57

The amount granted was 10,903*l.* This is a smaller amount than in any year during the last nine years. . . . . The total cost of the works proposed is 139,556*l.* The number of additional seats to be obtained is 20,670, including 17,949 for the use of the poorer inhabitants, of which 5,156 are to be reserved for children. The committee have also to state that in the course of the year the society has paid 121 grants, amounting to 15,194*l.* to places at which works undertaken with aid offered in former years had been completed. The additional seats secured with this assistance are 28,585, including 25,904 for the use of the poorer inhabitants.

The new churches completed in the course of the year are 39
Churches rebuilt 29
Ditto enlarged, &c. 60
121."



ST. ANDREW'S DISTRICT CHURCH, LAMBETH.——MR. S. S. TEULON, ARCHITECT.

or *patrons*, to discover where it is that merit and capacity are in waiting, and how best to use these—without, by departmental and official restrictions, and unworthy suspicions, damping the flame of *art-spirit*. Treat the British architect as one following the calling of *artist*,—as one whose business it is to be something in addition to a skilful constructor, and a supervisor of accounts,—assume, moreover, that he is not necessarily otherwise than yourselves,—a man of honour and gentlemanly feeling,—and do not haggle about the reward which you give for learning and professional qualifications,—and we doubt not he will respond to your appeal.

Truly, however, are we compelled to say, that by the Government such progress towards good national architecture and grand public works, was not inaugurated on Thursday, the 29th of May, 1856. What was done in the way of fireworks, indeed, was successful; for we have never seen greater beauty of colour than that displayed for nearly two hours on the night of the commemoration. But in the illumination, the Government standard of art was of the lowest order. The public offices—"imposing," certainly—in taste were beaten by clubs, companies, theatres, city buildings, and even by shops and private houses. Some of the houses, indeed, with chandeliers lighted, and candelabra in the windows, succeeded in producing an effect which, though by simple means, was both novel and tasteful. Seldom had an Asmodeus so good a chance of seeing what of art there is in people's abodes,—and for us, the critical survey was not wholly valueless. What, however, could be expected from the manner in which the Government ordered their part of the display? We are told, and the statement is borne out by what was said by one of the ministers, that things were directed to be done *as on former occasions*. That is to say, the precedent of the most signally tasteless periods of British art was to be unreasoningly followed. Were there no artist-architects in all London, to whom could have been entrusted the designs, and the direction of lamp-men and gas-men? Surely, no such artists could have been engaged,—or they were restricted in such manner as led to little difference of result. It was the show of one night,—it was a mere illumination; but no Government can set to work a thousand or so of artizans on *any* old precedent, for any object, without doing them, themselves, the public eye and taste, and as an ultimate result, the national credit and position, a positive, though possibly a not immediately perceptible, injury. We are making no peculiar claims as to the power and office of *art*, which we might well do in such a case, at another time. It is fatal to everything that concerns the nation,—this going back, in any particular. It is pernicious, or rather destructive, to *mind*.

Somehow, in things connected with architecture, the country is always working *under* the mark of existing professional ability. For everything that is set up to deface our streets, the influential part of the public press is ready to discredit "our architects," who have so far, as the nearly invariable rule, had no voice in the matter.

We doubt not there is many an artist amongst us, who, with proper time allotted, would have displayed taste in the illuminations. Could the valuable library of the Government's own Department of Art suggest nothing which might have been improved upon? Was the Department ever spoken with upon the subject? Are the differences of scale between parts of the same design; the Brobdignagian crowns, and painted-tin flags, and the vile drawing and modelling of the various devices, to be taken as the result of expenditure on art of late years. Moreover, if we may ask questions at the Circumlocution Office, we *want to know* what is meant by Government illuminations of buildings. We confess (only of course our opinion goes for nothing against the Barnacles') that to us the intention should seem to be simply to *illuminate* the buildings. At Rome, they light up the church of St. Peter by small lamps following the lines of the architecture. The same thing was tried one year at the Travellers' Club. It was sparingly attempted at the Horse Guards. The most effective application of light for ordinary illuminations, is that which has been made by Sir Charles Barry, at the Reform and Travellers' Clubs,—and which Mr. Sydney Smirke appears to have followed out at the Carlton Club. At least, it follows that several modes of lighting up the architecture of a building might be devised,—productive of an effect far superior to that gained in the chief of the Government offices by the lamp-man's designs. Why, in the inauguration of Peace, was the noble architecture of St. Paul's left in darkness? Why was Trafalgar-square left barren? Why was no attempt made to combine the beauty of light with the rich decoration of the Houses of Parliament? And why were the steeples and columns of the metropolis equally unattended to? It appears to us that much better effect might have been produced by some of the means referred to, than by the plan of covering the fronts of buildings with screens and scaffoldings. Boards, poles, and pipes there were by day; and there were tasteless devices by night,—at least where these could be lighted. The *architecture* was screened off. *Lucus a non lucendo*. Surely there was dead wall somewhere in the town, that might have answered the Government purpose,—and left enough light in their rooms, to see the colour of red tape, by day.

The principle adopted in the lighting at Hyde-park corner was entirely different to that which we have noticed, and here the architecture appeared to good effect; and the bas-relief at the top was beautifully defined. We imagine that the buildings in the City were better managed; but it was not possible to get there from the other end of the town, and the newspapers give us little information. The Mansion-house, under Mr. Bunning's hands, no doubt did credit to the City for better judgment on such occasions; the Royal Exchange had lamps twined spirally round the columns, and its illuminated pediment must have appeared very beautiful; the India House also had its lights disposed in architectonic character, the pediment having scroll work, and festoons ran along the whole upper part of the *façade*. Whilst, in the western part of London, the very home of art—the National Gallery—was far from satisfactory. Some of the transparencies exhibited, as those by Messrs. Charlton, Allen, and Co. of Mount-street, and Messrs. Day and Son, Lincoln's-inn-fields, were creditable as pictures.

HOME-MADE GAS.—A baker of Herron-gate, near Brentwood, says a country paper, has constructed on his premises a gasometer, on a new principle, which occupies a space of about 6 feet square. He has fourteen lights, and the expense per night, burning from 7 to 12 o'clock, including interest of money for cost of erection—less than 20*l*.—is 2¼d.

PROVINCIAL NEWS.

Horncastle.—The acoustic properties of the new Corn Exchange here are said by the *Lincolnshire Chronicle* to be very defective, the reverberation of the voice of each speaker, at a recent public meeting held in it, having been so great as to render the words nearly unintelligible except to those in the immediate vicinity of the speaker. One main purpose of the building, it is added, was the supply of a good public room for large meetings. It is hoped the architect will be able to remedy the defect.

Norwich.—The new Free Library is now roofed in, and will be opened in the course of the autumn.

Nantwich.—The foundation of a new Grammar School, for the education of the middle classes, was laid at Nantwich, a week or two since, by Mr. G. F. Wilbraham, at whose personal cost it is to be erected and endowed.

Chester.—"We are informed," says the local *Chronicle*, "that some most extraordinary discoveries have been made relative to the plans and estimates for the construction of the intended workhouse, for the Boughton Union, and that the discussions on the subject at the last meeting were remarkable. If what was then alleged is capable of proof, the steps taken were doubtlessly right; and if all that transpired as to the compilation of the plans can be sustained, there is much reason for animadversion. As the board does not allow the presence of the press, we are not in a position to speak of what occurred with safety or correctness. When there is a studied secrecy, the community has a right to suspect, and will believe the worst, as to motives and acts."

Liverpool.—The town council, at a recent meeting, decided to adopt a recommendation of the Improvement Committee, to purchase 1,500 square yards of land in Shaw's Brow, for 5,550*l*. as a site for the erection of a new library and museum. This site is in the immediate vicinity of St. George's-hall.——Workmen have been making preparations, according to the local *Journal*, for placing the sculptured finials on the dwarf granite pillars or gate-posts of the parapet surrounding St. George's-hall. These finials, which are to be twelve in number, are representations of Nereiads and Neptune's trident-bearers, arranged in pairs at each gate. Each of these figures is represented as rising out of the wave, and grasping a cornucopia surmounting fruit: on the upper end is a cluster of foliage, on the leaves of which the lantern rests. The heads and trunks of the figures are of heroic size, standing about 7½ feet high. They have been modelled and sculptured by Mr. G. Nicholl, of London, in fine Portland stone. Each of the figures is of one block, and in its finished state weighs about a ton and a half. The white colour of the sculptures contrasts with the red hue of the granite pillars on which they are placed.

Manchester.—The new circular room at the Market-street end of the Royal Exchange is about to be opened to subscribers. A gallery runs round the end, which will be devoted to reading, the newspapers being placed on stands and tables. The open floor below will be entirely devoted to its legitimate use as an Exchange. The gallery is reached by a wide and light open iron staircase. Five large additional self-ventilating lights are being inserted in the groinings, making nine in all, one in the ceiling of each groined recess. There were at first but four of these lights, but it was discovered that they caused awkward shadows, and hence the increased number. There will also be lights under the gallery. The windows are filled with plate glass from St. Helen's.——A foolish strike, says the local *Courier*, amongst the bricksetters and their labourers employed at the Manchester New Workhouse, at Crumpsall, which retarded the progress of the works, has terminated, but not quite voluntarily on the part of the workmen. The strike was not one of the ordinary kind between masters and servants, but arose from a ridiculous dispute between the bricksetters and their labourers, and had no reference to the rate of payment, but arose from the employment of a bricksetter who was obnoxious to a labourers' union in Blackley. The delay in the works caused by the dispute was found to be so inconvenient, that the Manchester Board of Guardians resolved to support the contractors, Messrs. Bellhouse and Sons, in compelling the resumption of work, under the protection of a strong body of county constabulary stationed on the ground: other labourers were accordingly procured, and the buildings are proceeding.

Sheffield.—Lord Wharncliffe has caused several improvements to be carried out at Wortley. A gasometer has been erected on his Lordship's premises, and mains laid into the village, where the Wortley Arms and several other dwellings have already been lighted up. His Lordship has also given instructions for some public lamps to be erected in the village. Arrangements are being carried out, likewise under his Lordship's directions, for bringing to the village an ample supply of water.

Kelso.—The Corn Exchange here is now completed and opened. The building, as described by the local *Chronicle*, is in the Old English style of architecture, and with its spires and gilded vanes, is said to be an ornament to the town. The interior of the Exchange is an oblong square, extending 105 feet in length by 52 feet in breadth; and, deducting 5½ feet as the space occupied by the stalls all around, there remains an area of 91 feet by 41 feet, for the use of the public,—equivalent to 415 square yards, and capable of containing with ease 1,200 people. The Exchange will be rendered available, under certain conditions, for holding public meetings, and for lectures, concerts, &c. for the last of which it is suited, having a gallery extending the whole breadth of the interior for the accommodation of an orchestra.

PUTNEY BRIDGES.

THE conservance of the Thames is supposed to be in the Corporation of London, which enjoys an arbitrary rule from Gravesend to Staines. Its conservation concerns every citizen, since on free navigation and proper regulation depends much of our commercial prosperity, as well as the health of the inhabitants. Some wants may be difficult to supply: there is, however, one very simple matter that comes under their jurisdiction, and that is the due allocation of bridges;—first, that the design is a good one; next, that the position is right; and lastly, that it obstructs no way: yet it would seem that little, if any, attention has ever been paid to these things, much as they concern the free intercourse both on the land and water.

Old Putney-bridge has long been the standing reproach of our *pontifical* corporation: it is a sort of mole to obstruct navigation, a relique of antiquity little adapted to vessels and boats such as now navigate the Thames: being about 700 feet long, it has no fewer than twenty-five pile buttresses, between most of which there is but 15 feet of space. Scarce a beam of its structure but has been drawn and replaced so often, that it is all at jars: still, being the property of a private company, the patchwork is kept together so as to pay a dividend, the directory making it a point to discourage traffic on the Lord's day, by charging *double tolls!* That is, however, their affair. Railways find that it pays better to encourage the multitude by charging *less on Sunday*.

Another bridge has been lately constructed close to the old one, but diverging from it at an angle of 10 degrees: it is built on the new principle of the tube, with buttresses of concrete compacted in iron cylinders, having four columns on each pier: the design might have been handsome, and, at a comparatively small increased expense, it would have served the purpose of an aqueduct, a foot-way, and also a carriage-way; yet this bridge which *mars the view* of the river, and the aspect of the hamlets of both Fulham and Putney, is dedicated solely to the object of an aqueduct! The steamers plying up or down had formerly difficulty enough to steer clear of the buttress beams: they have now another breaker ahead in the aqueduct piers. Having cleared Scylla, Charybdis is at hand: there is scarce room in the old bridge water-way for a Richmond boat: our little skiff, on steaming up, hugged close on the timber; then stopped and sidled through.

What on earth were the corporation about

when they tolerated the erection of a second bridge alongside the old one? What were the proprietors of crank shares in Old Putney-bridge dreaming of, when they omitted, or forgot, or refused to agree with the Water Company, to erect a more solid and more permanent structure, that *might have served for all purposes?* Where was their discretion? Where was their taste? The genius of *un*civil engineering could hardly produce a more hideous example of pontification, than the shaky, wavy, crooked old Putney! It strikes off obliquely from the Fulham-bank to the last-piled interval, where it turns again to the right, to avoid the churchyard, and to open obliquely on the main street of Putney. Then comes the new bridge—no, the aqueduct on stilts—which has no regular form, nor has it any symmetry!

A young Todleben offers a remedy. First, sink iron cylinders alongside those of the aqueduct, and exactly corresponding in appearance: let the buttresses be wider and stronger, if required for carriage traffic: connect the framework of another tubular span (a more massive one), with that now sustaining the pipes: let the new one be used for carriages, the other for foot passengers. There would be no great difficulty in designing a graceful finish, in form and ornamentation.

The new bridge has one advantage: it crosses the stream at right angles, and leads direct from Putney High-street, nearly to Fulham church, but clear of it. It has, moreover, between piers, open spaces of about 70 feet each. Let the companies at loggerheads, lay their bridges and differences together, the sum will be, great public accommodation, scenic improvement of this beautiful reach of the river, and the clearance of the deformed old wooden piles, which have been the occasion of many a loss and calamity. At present the wrong bridge is in the right place, whilst the wrong place is occupied by a hedge-carpenter's pontoon, that never was right; both together presenting, to foreign artists and engineers who visit London, the sublimation of absurdity.

THE WORKING EXPENSES OF RAILWAYS.

INSTITUTION OF CIVIL ENGINEERS.

AT a meeting, on the 20th of May, the proceedings of the evening were commenced by reading a reply of Mr. Robert Stephenson, M.P. president, to observations in the Second Report of the Postmaster-General, to the House of Commons, dated 30th January, 1856. This reply has been printed *in extenso*.

The paper read (in abstract) was "On the Improvement of Railway Locomotive Stock, and the Reduction of the Working Expenses," by Mr. D. K. Clark.

It was stated that the design of the paper was to discuss the locomotive engine physiologically; to consider some departments of practice which appeared to be in a transition state; to endeavour to indicate how far, in some respects, the locomotive, even in its present advanced state of existence, was susceptible of improvement; and to form some estimate of the pecuniary advantages thus derivable. The three elements of the locomotive,—the boiler, the engine, and the carriage,—were considered successively.

With respect to the boiler, the fuels in use, in this country, were stated to be coke and coal. The author had in a previous paper shown, by mechanical analysis, that the combustion of coke in the locomotive was practically complete; and he adduced, in corroboration, the results of a subsequent chemical analysis of the gases of combustion, by M. Ebelmen, in the engines of the Paris and Lyons Railway.

The author adduced the results of trials made by him, in 1850—51, and by Messrs. Woods and Marshall, in 1854, which showed, that in the prevailing type of boilers, the evaporative powers of good coal and good coke were as 2 to 3; coal doing mechanically just two-thirds of the duty of coke. He proceeded to give an account of recent trials made by him, in the beginning of this year, with the "Canute," on the London and South-Western Railway, one of Beattie's passenger-locomotives, planned expressly for the combustion of coal, and the heating of the feed-water. It was argued that, on Beattie's system, an economy of 36 per cent. of coal was effected in comparison with ordinary engines burning coal; and that this system was on a footing of equality with coke-burning engines, in evaporative efficiency of fuel, weight for weight.

The water supplied to locomotive-boilers was stated to be generally impure, mechanically, or chemically, and to affect very injuriously the durability of the engine, reducing, in one case, the durability of the tubes from eight or nine years, with soft water, to three years, with hard water. The loss by priming with bad water was shown to be considerable. It was concluded that the water supplied to locomotives should be previously purified, chemically and mechanically, in large tanks, or reservoirs.

With respect to the engine proper, the author maintained that the link-motion was a sufficient and satisfactory expansion-gear; that its merits were not appreciated; and that in the ordinary practice of expansive working in locomotives, the steam was not cut off earlier that at 40 to 50 per cent. of the stroke; but that, with proper arrangements, it might be cut off at one-fifth. He argued also that the steam should be superheated, and the cylinders perfectly protected; and that the slide-valves should be balanced.

The following was an abstract of the successive items of economy of working charges, separately estimated:—

By the successful substitution of coal for coke	33	per cent.
By efficiently heating the feed-water	15	„
By the use of pure feed-water	10	„
By protecting the cylinders, and superheating the steam	10	„
By increased expansive working	25	„
By the correct equilibration of the engine	10	„

The gross resulting economy would then be represented, not, of course, by the direct sum of these per centages, but by the result of the successive reductions obtainable by their successive application. Thus, after making the first deduction of 33 per cent. there would remain a balance of 67 per cent. to be operated upon for the second deduction, which was 15 per cent.; but 15 per cent. of 67 was equivalent to 10 per cent. of the original quantity, and would leave 67 — 10 = 57 per cent.; the third deduction to be made was 10 per cent. of 57, or 5·7 per cent. of the original, leaving 51·3 per cent. as the balance to be operated upon for the next deduction. Continuing the operation in this manner, the gross resulting economy would amount to about 70 per cent. of the existing average working charges. Allowing for contingencies in the estimate, 50 per cent. was adopted by the author as the probable average saving that might be effected in the consumption of fuel, and generally in the working charges of the locomotive stock of the railways of the United Kingdom.

The average apportionment of the receipts on the railways of this country was stated to be as follows, on the authority of Mr. Chattaway:—

Working charges	46½	per cent.
Interest on guaranteed capital	28½	„
Dividends in respect of ordinary shares	25	„
Gross receipts	100	

Also, that the average cost of locomotive power was 29·3 per cent. of the receipts; consequently, the saving, estimated by the author, would be one-half of this, or 15 per cent. of the receipts, and would raise the available dividends from 25 to 40 per cent. of the receipts; or from the average on ordinary share capital, stated by Mr. Chattaway as 3·14 per cent. to a dividend of 5 per cent. per annum.

The president's *conversazione* on the 27th was attended by a very large number of persons: there was as usual a good collection of models and works of art. We may mention that Mr. Charles Manby has resigned the office of secretary, which he has long held with advantage to the Institution; and that Mr. James Forrest has been appointed in his stead. This has caused a vacancy at the Society of Arts, to fill which candidates have been advertised for.

THE THEATRE.

The Princess's.—As a graceful act on the part of Mr. Charles Kean, we may be excused, perhaps, for mentioning that he has recently presented to the conductor of this journal a very elegant vase of silver, 12 inches high, inscribed as follows:—

"To George Godwin, F.R.S. from Charles Kean, as a slight token of the high appreciation entertained for valuable assistance in architectural details, while carrying out the design of placing before the public correct historical illustrations of "Macbeth," "Henry VIII." and "The Winter's Tale," produced in the years 1853, 1855, 1856, at the Royal Princess's Theatre, under Mr. CHARLES KEAN'S direction.—May, 1856."

The *Winter's Tale* continues to fill the house nightly to the ceiling.

The Adelphi.—Mr. Webster intends to build his new theatre in iron; but it is not correct, as stated in some of the papers, that the works are already being proceeded with. The plans are not yet matured. On the 4th inst. the well-known Adelphi piece *Vanderdecken* was revived there for the benefit of Madame Celeste, when that versatile and very admirable actress played the part made famous by poor O. Smith.

Paris.—A theatre of large size is being built, by M. Charpentier, in the Place de Châtelet, to hold 6,000 persons. It is the speculation of a banker, we are told, and will be a fine thing as far as construction goes.

Ventilation.—It would be well if, taking advantage of opportunities, managers of places of amusement would endeavour to improve the almost universal fault of want of *adequate* means of exit for the foul air generated in them. Science would surely show how this could be done, without creating "draughts." Managers, as caterers for the public, are morally bound to provide that most necessary of all things,—air that *may* be breathed; so as to prevent their audiences undergoing a *peine forte et dure* while passing the ordeal of a modern "entertainment." Yet scarcely is this deemed worthy of passing notice; and the atmosphere is, generally speaking, in such places, so compounded of bad gases, as not only to render respiration difficult, but to inflict a certain and ineradicable injury on the audience. The insertion in your columns of this universally-shared remonstrance cannot fail to draw the attention of those to the subject whose business and whose *interest* it is to effect the remedy. Improvement, it is true, should not stop here, as a visit to the Parisian theatres, &c. most amply testifies; but assuredly it is the first and all-important desideratum to achieve; and till it be obtained, may the public, and their organ, the fourth estate, raise their voice in protestation against an evil unworthy the scientific progression of this nineteenth century.—PUBLICOLA.

WELLINGTON COLLEGE, NEAR SANDHURST.

ON Monday the 2nd, her Majesty laid the first stone of the intended college in honour of the late Duke of Wellington. A description of the proposed building, with view and plan, will be found at p. 85 of our present volume.

In preparing for the ceremonial, advantage was taken of the permanent scaffolding raised for the erection of the building, the exterior poles of which formed the main supports for the seats that were raised for the general company: of these five descending from the passage-way at the back towards the interior, like an amphitheatre, covered a portion of the foundations of the building, but leaving the arcade piers of the two quadrangles entirely clear in front. The base stories of these piers being fixed in their places, defined the interior lines of these quadrangles, those adjoining the chief corner-stone being carried two feet above the general base line, for the purpose of showing the alternate bright red brick and box stone construction of the building. The front seats were elevated five feet from the ground, so as to prevent the guards, who lined the enclosure, from interrupting the view therefrom. In decorating the front and supports of the awning covering the seats, red was used as the ground colour, the front of the lower seat giving a red line, under which a lining of blue gave a base to the whole, and at the same time a foil for the scarlet tunics of the grenadiers. The supports were lightened by spiral fillets of white, and connected above with a valance of red. At regular distances the supports were topped by flags, placed in groups of three, two being sloped and looped up, while the centre one, slightly elevated, hung freely on its staff. The intermediate supports were decorated with masses of wild broom and furze, whose yellow bloom and

green leaves, bound with laurel and red cloth festoons, made a pleasing contrast. Over the passage to the Queen's terrace, on the north front, a bust of the Great Duke was placed on a covered pedestal, and encircled with wreathed laurel and bays: above, on either side, were grouped flags as on the other sides of the quadrangle.

The supporting scaffolding, that carried the windlass and men that lowered the stones, was decorated to agree with the other portions: a ground colour of red, bound with red and white twisted cord, drooped in festoons and tassels to the flat parts, edged with a full valance looped up, the upper angles having their effect heightened by two sloped Union flags looped up; while, in the angle between each pair, a Royal Standard freely spread its bright colours on the breeze. The massive timbers that carried the whole were covered with the prevailing colour, round which twined bands of white, alternately with wreaths of laurel and bay, the general effect being backed by the tall masts of the scaffolding, each of which was graced with standards, flags, and banners, in every variety of application, producing a general effect that was much admired by the Court and Governors. Her Majesty and Prince Albert personally expressed to the architect, Mr. Shaw, their approval of the decorations and arrangements.

The whole of the general arrangements and decorations were superintended by the assistant-architect, Mr. Thomas Renton.

THE OXFORD ARCHITECTURAL SOCIETY.

AT the fifth meeting, held on the 21st ult., Mr. Street read a paper on German Pointed Architecture. He entered at considerable length into the question of the date of German buildings, and showed that they were always much behind both those of France and England in any new development. A comparison of dates, he proved, must at once set aside any claims of Germany to the invention of the Pointed style. For whilst buildings whose whole character was directly derived from Romanesque or Lombard works were being built in the one country, Amiens and Westminster, and a host of churches of similar style, were rising in the other. He then proceeded to show the peculiarity of the ground plans of German churches. Each country affected a peculiar arrangement of the ground plan. In France the apsis was brought to perfection: in England the square east end was all but universal; whilst, in Germany, though both these plans were also found, the common plans were the transverse-triapsal or the parallel triapsal. The attempts at imitation of the French Chevet were very rare, and Cologne Cathedral, whose plan is obviously borrowed from France, and entirely unlike the German type, is a unique example of this arrangement really well carried out in a German church. He then entered into the question of window tracery, and exhibited a large number of drawings of German windows of the most remarkable character, among which those from the cathedral at Minden were, perhaps, the most curious.

On the 26th ult. the members of the society visited Coventry, and examined especially the site of the ancient cathedral. A writer in the local *Standard* says,—"The cathedral occupied a place called Hill-close, on a declivity from the north side of Saint Michael's and Trinity church-yards, and ran parallel to and at no great distance from Trinity Church, its south door opening into Trinity Church-yard. This grand edifice was built after the model of the cathedral at Lichfield, and was equally beautiful; and as Lichfield has the transept in the centre, similar to Coventry, and is 138 yards in length, the cathedral at Coventry probably reached from the entrance of the Blue-coat School to Mr. Pearman's house in Prior-row, as it is stated that the house built by the Rev. Mr. Bryan (now Mr. Gulson's), was on the cross aisles, and near the great central spire. All historians remark the grandeur of effect that must have been produced by the assemblage of three such fine churches, when the cathedral was standing.

This noble cathedral was levelled to the ground by Henry VIII. at the time he destroyed the neighbouring monasteries, after standing nearly 500 years. Only one fragment remains (now worked into a dwelling-house) of this once fine, costly, and majestic building. The solemn and religious processions of the monks along its long and richly-adorned aisles have long ceased, and its glory remains in its reminiscences."

"In 1649 the city granted part of the site of the cathedral to John Bryan, vicar of Trinity Church, who erected a house over against one of the steeples of the western front, near or over which passed the cross aisles of the original church: he also erected some dwelling-houses on the foundations of the two steeples, which were originally on both sides of the entrance from the Butcher-row; cleared the grounds of the ruins, and converted it into a garden. About the same time another part of the ruins was levelled, in the removal of which was discovered a great abundance of carved and gilt stones: of this was first formed a bowling-alley, and afterwards a garden: the east end of the cathedral had been previously converted into gardens and orchards, and the eastern wall of one of them is now standing on the original foundation of the chancel."

COMPETITIONS.

Liverpool Free Library.—The committee have just completed the first stage in the proceedings. There were 115 sets of sketches. These were hung in a suite of well-lighted rooms, the key of which was kept by the chief librarian, and to which no person, we are told, has had access except the members of the committee and the corporation architect called in to advise and assist. A schedule was prepared under the direction of the latter gentleman, giving, in a tabular form, the area respectively covered by the buildings in each design, the area of accommodation in each department, the mode of lighting, &c. so as to facilitate the comparison of the plans. The committee then went over the plans separately, minuting down their observations on each, and met to compare notes from time to time. Finally, the committee's observations were compared with those of the professional men (the chairman and the corporation architect). The result has been that sixteen designs have been unanimously selected, any of which the committee think would answer their purpose, with such modifications as any plan would have to undergo before being finally carried out. The authors of these sixteen will now be called on to mature and complete their designs for the final competition. The other designs are being *returned*. We must confess to some misgivings as to the goodness of the course which is being pursued, although we have none as to the honest intentions of the committee. It has a hole-and-corner aspect, which we are not prepared at this moment to recommend for imitation.

Scarborough Cemetery Chapels.—On the 23rd ult. the premiums were awarded as follow: First, to Messrs. Pritchett and Sons, architects, Darlington; and second, to Messrs. Johnson and Haswell, architects, Newcastle. Upwards of twenty sets of plans were sent in for competition, and the Board have expressed a favourable opinion of their merits generally.

DRAUGHTS IN CHURCHES.

ALL who have studied the matter will agree with Mr. Rosser in his remarks with reference to the importance of guarding the air under the roof surface from draught, and from change of temperature. But, in order to do this effectually, it is *essential* that there should be not only the double substance of covering, but also a *space* of *air* between the two substances. Even double boarding and asphalte are not properly effectual without two inches at the least of air between the outer covering and the inner lining. In laying a slated roof, the best possible plan is to fill in the spaces between the slate battens with *plastering lath*, and *flush up* the space with coarse plastering mortar, before the slating is put on. In a tiled roof, *torching* from within answers the same purpose. The rafters may then be lined beneath with boarding, or the boarding may be filled in between the rafters, care being taken to leave the requisite space between it and the covering.

W. W.

APPROACHES TO HYDE PARK FROM BROMPTON.

UNDER the above title, in the number of the *Builder* for May 24th, there is a curious statement from one who signs himself "Brompton Square." It is really marvellous to see how a self-interested party can distort the plainest facts. A cursory reader might imagine that an injustice had been done by the very parties upon whom, for the second time, a gross injury is now attempted.

It is more than inferred that the owners of the houses lately erected on Lord Listowel's two fields have deprived the inhabitants of Brompton-square of some long existing right or privilege, whereas the exact contrary is the fact. Handsome and valuable houses were erected on Lord Listowel's property, with the express understanding that his Lordship conveyed to the owners thereof all the rights and privileges that he had himself enjoyed; the greatest, and what constitutes the real charm of this locality, being its privacy, and the absence of any thoroughfare. Why, therefore, is our property, for which we have paid so high a price, to be depreciated, and a most serious injury inflicted upon us, for the purpose of enhancing the value of the property of others who have not contributed one farthing towards the large expenditure incurred by Mr. Elger in the vast public improvements he has effected in this neighbourhood?

A thoroughfare through our property would doubtless enhance the value of the houses in Brompton-square, which were erected long before the remotest idea of such a contingent advantage; but the occupiers of them have been deprived of no right; and, so far from their being in a worse position now than at the formation of that square, it is well known that two roads have recently been made by the Crown, a short distance westward of it, leading direct from the most valuable and populous parts of Brompton to Hyde Park and Kensington Gardens, independently of the thoroughfare which has long existed by Rawstone-street. The owners of property in Prince's-terrace, Rutland-gate, and Ennismore-place, have too much confidence in the justice of their cause, in the English feeling of fair play, to fear that their property is to be so seriously depreciated, because it may suit the purpose of one or two well-known interested persons to set on foot an agitation, the object of which is to enhance the value of their own property, at the sacrifice of that of many others whose simple offence is that they desire to live quietly and enjoy their own rights.

A FREEHOLDER OF PRINCES-TERRACE.

*** We give place in fairness to this the first of two replies received; but we must add that the letter in question was written by one who we believe has no more *personal* interest in the matter than we ourselves have in our advocacy, now of long standing, of the endeavour to obtain this much-needed opening to the Kensington-road from the Brompton-road. Those owners of houses in Prince's-terrace who are opposed to it must not imagine it is merely a question between them and the owners of Brompton-square: it is a question between them and the public, and on that ground alone we have urged it. We doubt altogether the supposed injury which would result to them. The arrangement of the thoroughfares of a great metropolis is a matter of public concern; and if it were not that self-interest itself, taught by experience, usually renders interference in this respect unnecessary, it would be the duty of the legislature to pass such enactments as would obtain the most direct means of communications for the community at large. Let us imagine the condition of London, or any large town, if the owner of each separate plot of land, on finishing his street, had built a wall at the end of it, and stood upon his "rights."

BARN FLOORS.

DURING the last two years I have laid down several barn-floors with asphalte (as described by Mr. Greaves) in this county. I find, however, that they do not answer their purpose in the most important point, viz. *they retain the moisture*, and consequently destroy the grain. In all other points, I can fully confirm Mr. Greaves's testimony.

Could any of your correspondents suggest any means to remove the moisture, the floors would be far preferable to any others for the purposes named.

I have thought that if brick or stone drains were put under the floors, at about 4 feet apart, and 12 inches sectional square, the spaces filled with broken brick or stone, and the blocks of asphalte laid thereon, with the coating run over it, that might prevent dampness. In the barn-floors that I have had laid down, I put 9 inches of broken brick and stone (*but no drains*). Still, the moisture rises, and the tenant is obliged to have a sheet for the corn to lie upon. If this could be remedied, it would be of great service both to landowners and their tenants.

G. D. POCKLINGTON.

STRIKE OF SHIPWRIGHTS AT LIMEHOUSE.

AN unfortunate dispute has occurred in consequence of an endeavour of Messrs. Young, Son, and Magnay, so to arrange their times of work and refreshment as to enable their workmen to leave off half an hour sooner in the evening, and even to diminish their time of real labour by some ten minutes, without altering or diminishing the amount of their day's wages. Simply, one would imagine, because an arrangement so promotive of the improvement, recreation, and welfare of the men has originated with the masters, and assumed the shape of a stiff-looking "notice" that it was about to be done without consulting the workmen themselves, a determination has been come to by the men, and by a meeting assuming to represent "the whole of the shipwrights of the port of London," to resist, as an infringement, not of habits and customs, but of rights and privileges, the endeavours of Messrs. Young and Magnay to economise and arrange the hours of labour to the advantage of both parties. The gist of the intended change appears to be the throwing of a twenty minutes' interval, or what is called "allowance," between breakfast and early dinner, into the breakfast *hour*, in place of *half* hour, so as to enable many of the men to enjoy their comfortable breakfast meal at home with their families, instead of at a public-house.

The men are not content to be deprived of this fourth meal or "allowance" between breakfast and tea, which tea, by the way, by the new arrangement, they would also have the opportunity of enjoying at home as well as their supper, in consequence of the half hour for tea being thrown a little forward to, and cut off the *end* of, the day's labour, instead of coming in the midst of it, like the rest of these many intervals, allowed, as they are, nowhere but in London, and really not requisite for health or even rest in a day's work of only nine and a half hours: indeed, medical men insist that two hearty meals a day are sufficient for any one, far less four during the hours of work, besides, probably, one before going to work, and another after leaving it, or, in all, six meals a day! One object of the employers, in the present instance, appears to be the economisation of time; for these many intervals, as may readily be conceived, involve a much greater loss to masters and men than the mere measured minutes to which only they nominally extend. But keeping in view the immense advantage to the working man (so often insisted on in his behalf) of being able to throw down his tools *as early in the evening as possible*, we really cannot see any other reason why they have not regarded this as a positive *boon*, than simply because it did not emanate from themselves.

HOLYHEAD HARBOUR AND BREAKWATERS.

THE works now in progress at Holyhead, under the direction of Mr. J. M. Rendel, the engineer, are proceeding with activity, and will comprise a harbour of upwards of 300 acres of deep water, and a roadstead eastward of this, comprising from 300 to 400 acres of deep water, always available for vessels in case of their having to run to the old or the new harbour.

The works involve a north breakwater, 7,000 feet in length, of which 6,400 feet have already been formed, in from 7 to 8 fathoms of low water at spring tides; also an eastern breakwater of 2,500 feet, formed in from 3 to 4 fathoms of low water at spring tides, with all the necessary convenience of landing-pier for the largest class of Transatlantic steamers, with railways so laid down on such landing-pier that passengers may step from the boat into the railway carriages.

The quantity of stone used in the works up to the present time, and since 1849, is upwards of 5,000,000 tons. The peculiarity in the construction of the works, which has enabled the Government to carry and place in the breakwater this enormous quantity of stone in less than six years, is the introduction of a timber staging, first built into the sea, slightly in advance of the stonework, upon which there are laid five lines of railway, over which the waggons laden with stone are drawn from the quarry by locomotives, and the stone is deposited into the sea at 20 feet above high water by the falling of the bottom of the waggons, somewhat in the same way as the "hopper waggons" in the coal districts of the north of England.

The stone is obtained in masses, varying in size from that of ordinary building-stone up to 14 or 15 tons in a stone.

The average number of labourers and mechanics employed in the quarries and on the railways is from 1,100 to 1,200.

The expenditure up to the present time, including the purchase of land, has been upwards of 500,000*l.*; and it is calculated that by the time the works are completed, including the enlargement of the harbour as before referred to, the total cost will amount to upwards of 1,000,000*l.*

NEWS FROM ADELAIDE.

Water and Sewage.—The City Surveyor, by last despatch, had laid before the Municipal Council his plan for supplying the city with water, and for carrying off the sewage. The water pipes he proposed to lay just under the kerb stone at the side of each street, adjoining the pavement. Two sets of tanks to hold 300,000 gallons each, one for North Adelaide, and the other for South Adelaide, would be erected on elevated sites, so as to supply the city by mere gravitation. The tanks would each form a tower 82 feet high, the cost of tower and tanks to be 5,000*l.* For the disposal of the sewage, and besides a system of city sewers, the surveyor proposed to run an iron tube, of 4 feet diameter, along the bed of the river Torrens, from Frome Bridge to the Reed Beds, or even to the sea (a length of 8 miles), if the sewage could not be completely disposed of at the Reed Beds. The tube would cost about 12,500*l.* a mile. The iron plates, it was remarked, could be prepared in England. The *Adelaide Observer* urges the deodorization of the slaughter house refuse, and the sale of that and of the sewage to neighbouring farmers or horticulturists.

Temperance Hall, and Freemasons' Hall, for North Adelaide.—A meeting is reported in the *Adelaide Observer* as to the obtainment of funds for the erection of the Temperance Hall, already founded in Tynte-street. The architect, Mr. Cole, pointed out several plans, and in course of the discussion, it was suggested that the proposed Masonic Hall should be adopted by arrangement with the Masonic Hall Society, and the proposed Temperance Hall abandoned. It was ultimately resolved, however, that the architect should revise his plans of the latter, and advertise for the erection of the walls and roof.

St. Luke's Church, Adelaide.—The Episcopal Church of St. Luke, recently erected in the south-west part of the city, facing Whitmore-square, says the *Australian and New Zealand Gazette*, was consecrated by the Bishop on 14th February. The building is 66 feet in length, by 44 feet in width, including the side aisles. The sacristy is surrounded by a carved railing, and it is intended to construct the pulpit and other internal fittings of cedar. There is a large Gothic window over the altar, the upper part of which is stained glass, in which blue, crimson, amber, and white are blended. In the centre there is a cross, which is surrounded by a star, formed by the intersections of three triangular devices. The window has been constructed by Mr. Brooks, of North Adelaide. The erection of the building has been effected under the superintendence of Mr. Thomas Hall. The total cost, including the internal fittings, will be about 1,200*l.*

Adelaide and Gawler Town Railway.—The works on this line had not progressed so far as those between Adelaide and the Port in February last. The *Adelaide Observer*, of 26th January, gives a long report of the state of the works. It is intended to go no farther at present than the south side of the South Para, where the temporary Gawler Terminus will be erected, and the cost of a bridge obviated. The rails were all ordered, as well as other materials, in England, and it is expected that in the beginning of next year, the line will be opened for traffic as far as Salisbury.

USE OF PARTY WALLS.

HEMBRY *v.* SMITH.

IN this case, at the Rolls' Court, on the 30th ult. an interim injunction had been granted against the defendant, for having interrupted the smoke from ascending through the chimney-flues of the adjoining house to his own. The case was interesting to builders. It appeared that in 1839 Mr. Felton built the house No. 7, Halkin-street, Belgrave-square, and it was agreed with Mr. Thomas Cubitt that the intervening wall between the two plots of ground should be built as a party-wall, and it was accordingly built in part on Cubitt's ground, in Lowndes-street, next door. In 1844, Mr. Cubitt built the house No. 12, Lowndes-street, and then used two of the standing flues in the stack of chimneys left open in the party-wall, and no objection was taken to it until Mr. Felton, in 1848, had assigned the house to Lady Harrington. On her decease, the lease was assigned to Mr. Edmund Smith, solicitor. Up to the 19th of February, 1855, no objection was taken to the use made of the flues by Mr. Cubitt, but the tenant then found out that the smoke would not ascend through the butler's pantry chimney in Lowndes-street house, and it was found out that Mr. Smith had stopped up the tops of two flues in the party-wall, which he contended he had a right to do, as no person could be entitled to use his flues without his permission.

Mr. R. Palmer and Mr. Fielding Nalder were counsel for the plaintiff; Mr. Southgate for the defendant.

The case was heard on the merits, and the injunction moved to be made perpetual.

The Master of the Rolls held that the defendant had accepted the assignment with the full knowledge of the existing arrangement as to the party-wall in which the flues had been originally built. Mr. Cubitt's tenant, as well as himself, had a right to use the flues under that arrangement, and Mr. Smith ought not to stop them up. Under the circumstances, the injunction was proper, and must be made perpetual. The costs to be paid by the defendant.

BUILDERS' BILLS.

THE particulars of a case intended to show the necessity of security being given *to* contractors, as well as *by* them, in the construction of works under contract, have been forwarded to us, with comments, which, however, are too personal, and strongly put, for publication. The case was that of Brake, a builder, against Schmollinger, a tavern keeper, and related to work and labour done, materials supplied, and money expended in the finishing of three houses for defendant at Croydon.—Defendant pleaded not indebted, although there was alleged to be a balance of more than 300*l.* due to plaintiff on a contract, as agreed between the parties. The works had been commenced by a man named Pearman, who had drawn upon a mortgage, as the works went on; the money being advanced by the Rev. Mr. Mortimer; and Pearman having, it was said, drawn a considerable sum beyond what he was entitled to, left the premises, and went no one knew whither. Plaintiff was also paid by advances on the mortgage granted on the houses and land. The action for balance was brought in the Court of Common Pleas, at Guildhall, and was then referred to a Barrister-at-Law, for the settlement of all matters in dispute. Two surveyors were appointed on the part of the plaintiff, and two on the part of the defendant, who measured and valued the works, and after the measuring was completed, the defendant's surveyors refused to go farther into the matter. The plaintiff's surveyors therefore completed their account, and reported the value of the works measured to be about 140*l.* more than the day-bill amounted to. The arbitration then proceeded, and the arbitrator awarded his verdict in the plaintiff's favour, condemning the defendant to pay all costs. The award was taken up by the plaintiff at an expense of 153*l.* The defendant immediately he knew the result, became bankrupt. The plaintiff had thus done a thousand pounds' worth of work for an employer, it was alleged, not worth a shilling, and must now it appeared be a loser to the extent of at least 800*l.* The two surveyors' accounts alone are said to have amounted at least to 300*l.* a sum which the plaintiff must pay before he can prove his claim before the official assignee. The statement is altogether a strange one.

Notices of Books.

Shakspere's England; or, Sketches of our Social History in the Reign of Elizabeth. By G. W. THORNBURY. In two volumes. London: Longman and Co. 1856.

"SHAKSPERE'S England,"—much of it Shakspere's London,—is a pleasant olla podrida from the Great Shaksperean feast, well seasoned with varied condiments from other sources. The author leads us back to the sixteenth century days of gilt rapiers and roses on the shoe, of ruffs and fardingales, peaked and starched beards and slashed hose, to the days when fingers were forks and the tobacco-pipe the last novelty. He takes us rambling, gossipping walks "through Ludgate, up Cheap, and into Paul's, then away to the Bear-garden, in Southwark, and the Globe; anon past the old cross at Charing; to the Presence-chamber at Greenwich, or to Richmond, and back, to make a night of it, at the Devil Tavern, where the players and poets meet just under the chimes of St. Dunstan." These were the days when iris silks and leathern jerkins jostled each other in the streets of London, and when Drury-lane was Park-lane, and Whitehall and the Tower were Buckingham-palace and St. James's. London then, as now, could boast of various bridges; but amongst them were Fleet-bridge, Bridewell-bridge, and Holborn-bridge, while the clear pellucid salmon-sporting Thames could only boast of its one old London characteristic,—the wonder of all country cousins, and the pride of all Cockaigne,—"the bridge," with its houses and gardens, drawbridge, chapel, gatehouse, "nonesuch," et-cetera.

There is a lively and interesting chapter on the Architecture of Old London,—its mansions and palaces, and, indeed, of others besides those of London, and comprising minute descriptions of various well-known Elizabethan edifices, as well as some account of their architects, and, amongst them, of course, John Thorpe, the designer of many mansions and castles, and of his own quaint dwelling, with I T for its ground-plan,—I for the offices, and T for the house.

The subjects treated of in the present volumes are very various, and all combine in giving us, without many new facts, a graphic idea of life in the England of the sixteenth century.

Portsmouth Protected; a Sequel to "The Peril of Portsmouth;" with Notes on Sebastopol, &c. By JAMES FERGUSSON, ESQ. With plans and woodcuts. London: Murray, Albemarle-street. 1856.

OUR readers will recollect Mr. Fergusson's "Peril of Portsmouth," and the new system of fortification which he proposed. In the present "Sequel" this important subject is farther treated of, by the light which the late war has

shed on the science of fortification and defence. The author begins with a "personal introduction," in which he (with some quiet humour occasionally) gives a narrative of the discussions which have taken place in reference to his proposed system since his last publication, "The Peril of Portsmouth," appeared; and indeed of the development of his views generally, and the reception they have met with. The opening section of the present work treats of the results of the present war as bearing on the subject. Mr. Fergusson is of opinion that every circumstance of every siege operation hitherto undertaken in this war has tended directly to confirm the correctness of his views; while, on the other hand, not one single instance can be quoted which tells against them. He points out, however, what he regards as a misrepresentation, or misapprehension, of his views,—

"There is no ruse," he remarks, "more common in argument than to apply to your opponent's cause some nickname which shall seem to describe it; and when this has, by reiteration, become accepted, to reason from this epithet as if it were a fact. In the present instance it is usual to call this question, '*Earthworks versus Masonry*,' whereas nothing can be more incorrect than such a description. If one must be used, I would suggest '*Guns versus Bastions*,' the fact being, that what I object to in the old system is, that the complication of re-entering and salient angles and flanking defences impedes and neutralises the power of the artillery of the fort to stop or hinder the approaches of the enemy, and at the same time exposes the guns of the fort to be enfiladed and destroyed by the attacking party. To obviate this, I proposed to reduce the outline of the fort to the simplest elementary form, and then showed how, by successive terraces of earthworks, such an overwhelming fire could be brought to bear on the approaches of the enemy as would stop him altogether. If this could be done as cheaply or as efficiently by masonry, I would at once concede that point, considering it altogether unessential; and I am not prepared to say that it may not be done by masonry covered by iron plates, but, till this is tried, earth is the only material known, and therefore I advocate its employment."

It certainly is our own impression (without any special reference back to Mr. Fergusson's previous work), that "Earthworks *versus* Masonry" constituted what might very fairly be regarded as a correct description of his views by contrast with those of a more orthodox official description; and even in the present publication there are passages which we think at least excuse his antagonists for adopting it; but we presume there must have been some misunderstanding on this point.

The author draws attention to rather an instructive little incident in reference to the discussion, on his views, which took place at the United Service Institution, in May, 1853, when invasion from France was deemed more likely than war in the Crimea. When that discussion came on, he remarks,—

"I took with me a few yards of baize, with two or three iron rods, and showed how I would propose to stick them along the crest of the parapet, and to hook on the green baize, letting it drop across the embrasures in front of all the guns. The baize was full of slits, through which the besieged could see or fire, without the possibility of their being seen by the besiegers. This unorthodox expedient was received with 'great laughter,' and afforded an excellent opportunity for criticism during the following three nights. When we entered Sebastopol, we found curtains of rope hung up, exactly as I proposed, across the embrasure, and rope wound round the guns so as to stop the hole in the curtain through which the gun was fired. This rope-cloth, if I may so call it, was rifle-bullet proof, and would probably stop grape, while round shot would pass through without doing it much injury. There can be no doubt that the maintenance of the fire till so late a period was mainly owning to this expedient."

While our military engineers were laughing, Russian *friends* were *thinking;* and it really appears as if young Lieutenant Todleben had then been studying, and reaping the benefit of, such discussions.

In reference to Portsmouth, Mr. Fergusson remarks,—

"Since the pamphlet entitled 'The Peril of Portsmouth' was written, something has been done, and in the direction therein indicated, to place this important position in a better state of defence, but it has been done in such a manner that the *peril* has increased in a tenfold greater ratio than the *protection* afforded is likely to obviate."

All works on the shore at Southampton Water, he is of opinion, are certain to be attacked by land; and it is hardly probable, he thinks, that they will be attacked from sea where the channel is so broad, and while the enemy can land in safety beyond their reach. If this view is correct, he adds, and I have no doubt but that it is so, it is not a little ridiculous to spend such sums as have been spent to defend the Isle of Wight batteries against a land attack, and to leave those on the mainland in such a state that any active man may get into them without either pickaxe or spade. In allusion to the works recently constructed, and which are closely criticised, the author says,—

"In every work described above we have had to point out that great pains have been bestowed in strengthening those points where an assault was either impracticable or least likely to take place, but that the really vulnerable points had at the same time been left wholly or at least partially unprotected. Unfortunately, this system extends beyond individual works to a whole system of defence, and is being carried out at Portsmouth so as to neutralise any advantage, however small, that might accrue from the erection of these defences."

We can only say in conclusion that whatever be the merits of Mr. Fergusson's own system, and of his statements as to that adopted, his observations come with sufficient force to render further inquiry and examination necessary.

Miscellanea.

TESTIMONIAL TO MR. HERBERT MINTON.—The committee appointed to promote the erection of baths and washhouses in Stoke-upon-Trent,—towards which Mr. H. Minton lately offered 500*l.*—have unanimously resolved, "That his recent liberal offer of the sum of 500*l.* towards the erection of public baths in this town affords a desirable opportunity for giving public expression to the regard generally entertained throughout the country for his public and private character." The project, according to the *Stafford Advertiser*, is to erect a public building (by subscription), which shall adjoin the baths, and be appropriated to the advancement of art and literature, particularly amongst the young, and with which Mr. Minton's name is to be associated in perpetuity.

DISCOVERY OF ANCIENT WALL PAINTINGS.—Recent reparations at Hadleigh Church, Essex, have been the means of bringing to light some interesting mural decorations. They are of different periods,—the oldest and best being of the thirteenth century. Among those of a later date is a large representation of the legend of "St. George and the Dragon," with all the accessories, such as the king and the queen, and their beautiful daughter, who was given up to be devoured by the monster.

SECURITY OF LIFE.—By the continuation of staircases right up to the roof, and opening by means of a door at once upon it, a plan adopted by the late Mr. Cubitt, in Belgravia, a great facility of egress is gained in event of fire. Ordinarily there is the treble difficulty of fixing and finding a ladder, opening a trap-door with bolts, possibly stuck with paint, or rusted with age, and then a dormer to be unfastened with the same difficulty with bolts, so that if to this be superadded the confusion and hurry incidental to a fire, it is almost equivalent to no egress at all.—FIRE.

CAMP AT ALDERSHOTT.—Frequent complaints have justly been made of the want of architectural appearance in the buildings here, and the absence of professional assistance in the laying out and arrangement of this camp, where a grand opportunity offered for the application of all the modern improvements in sanitary and scientific construction, and was lost. We are told that a step has been taken with the view of improvement in future, but we shall wait for a result before we say much about it.

DRAINAGE OF LAND IN FRANCE.—A report has been presented to the legislative body at Paris on a Bill to regulate drainage in France. This report details the advantages obtained by drainage on the system of Government aid given in England and elsewhere, as ascertained by special commissioners, and recommends the adoption of a similar principle in France, at least till private capital be attracted to the great profits derivable from the system. The Bill proposes that the French Government shall be empowered to make advances to the extent of 100,000,000 francs, and endows the state or the person who makes the advance with a privilege of payment of interest and capital by instalments in a series of years, taking rank immediately after that of taxation.

TOMB OF WILLIAM COBBETT.—Over the slab which has hitherto covered the grave of William Cobbett, in the churchyard of Farnham, Surrey, a tomb has just been erected by Mr. Thomas Milnes, the sculptor who executed the statue of Nelson, recently put up in Norwich. The tomb is made of a durable stone, from the quarry at Roch Abbey, in Yorkshire. It stands near the porch of the church, is of solid workmanship, oblong in form, and is described as "in style following the plainest old English architecture." Farnham Church is within a mile of Waverley Abbey, and of Moor Park (once the residence of Sir William Temple), and about two miles from Aldershott.

EXPERIMENTS WITH CAST-IRON.—The interesting fact is developed by experiments of the U.S. Ordnance Department, that iron, by repeated fusion, up to a certain number of times, is thereby greatly improved in strength. Guns cast solidly, and those cast hollow, through which latter water was made to circulate after casting, showed an astonishing difference in their relative strength, the difference being in favour of the hollow-cast gun, which is attributed to the method of cooling, the solid gun, contracting from the outside, exerting a strain upon the arrangement of the particles of the metal in the same direction as the strain of the discharges. The experiments also showed that old castings are a great deal stronger than new: 8-inch guns, proved 30 days after being cast solid, stood but 72 charges; 34 days, 84 charges; 100 days, 731 charges; and 6 years, 2,582 charges. This phenomenon is accounted for by supposing that the particles strained in the cooling re-adjust themselves in the course of time to their new position, and become free, or nearly so.—*New York Paper.*

SOCIETY FOR IMPROVING CONDITION OF THE WORKING CLASSES FOR BATH.—A meeting of the citizens of Bath, convened by the Mayor, in compliance with a numerously signed requisition, was held on Saturday in last week, at the Guildhall, for the purpose of considering the propriety of establishing, in connection with the celebration of peace, a permanent Society for Improving the Condition of the Working Classes. The attendance was very numerous, and appropriate resolutions in favour of the object in view were unanimously passed, and some promising subscriptions at once announced.

KILKENNY ARCHÆOLOGICAL SOCIETY.—The May meeting of this Society was held at Tholsel, on the 14th ult., the Dean of the Chapel Royal, Dublin Castle, in the chair, when thirteen new members were elected, besides the Clonmel Mechanics' Institute. Various presentations and communications were received and other business done, and the Rev. James Graves read a paper on the records of the ancient borough towns of the county of Kilkenny.

SURREY ARCHÆOLOGICAL SOCIETY,—The annual general meeting will be held at Croydon, on Thursday, the 12th of June; Sir William G. Hylton Jolliffe, Bart., M.P., Vice-President, in the chair. Some very good papers are promised.

THE SCHOOLS OF ART AND THE GOVERNMENT DEPARTMENT OF SCIENCE AND ART.—The registrar, Mr. Norman Macleod, has had printed a list of the Schools of Art throughout the United Kingdom, in connection with the Department of Science and Art, completed to May 1856. From this list the following abstract may be given:—Established as Schools of Design, between 1841 and 1852, nineteen local schools. Established as Schools of Art, since 1852, when the department was constituted,—in 1852, two schools; 1853, fourteen schools; 1854, fourteen schools; 1855, two schools; 1856, four schools—thirty-six schools: total, fifty-five schools; including the nine London district schools, sixty-four schools. Number of persons under art instruction in public schools, 18,198; in central schools, 9,041: grand total, 27,239 persons.

PARIS BUILDING COMPANIES.—Two Joint-stock Building Companies are announced in Paris, and they are to build whole streets, squares, and boulevards, with theatres and places of entertainment and recreation. The scene of their operations is to be the Champs Elysées and the Neuilly-road, around the Arc de Triomphe, and from thence right and left. They promise to adopt the English plan of making houses suitable for single families, and of turning annual rent into part purchase of property, which at the end of twenty-five years is to become the tenant's ever after.

A CURIOSITY.—At the Barnetby Junction of the Manchester, Sheffield, and Lincolnshire Railway, may be seen, on the hill side, a church which has been whitewashed, body and tower!

HOMERTON.—Parochial schools have just been completed for the parish of St. Barnabas, Homerton, for 150 children, together with a dwelling for the master and mistress. The cost of the schools was 777*l.* and of the dwelling-house 296*l.* Mr. Edmeston was the architect, and the works were carried out by Mr. Perry, of Hackney.

SOUTHWARK IMPROVEMENTS.—Plans have been submitted to us for effecting a better communication from the London-bridge Terminus to the western district of the metropolis, by means of a new street from Wellington-street, Southwark, to Blackfriars-bridge, and from thence forward, *vid* Stamford-street, to Waterloo and Westminster Bridges. The projector of these plans is Mr. Thomas Taylor, architect. Mr. Taylor has shown two lines of communication, each deviating, from York-street, near London-bridge, to one side of the extensive premises of Messrs. Barclay and Perkins, and both ending in a line with Stamford-street. He recommends that along Park-street, or to the north of Barclay and Perkins's, as passing through property of very inferior value, not necessitating the removal of important works, and occupying the present streets one-third the entire length. The opening up of this sadly involved and noxious locality by some great thoroughfare is unquestionably most desirable. It would also form a direct route to the West-end from the London-bridge terminus of railways, and so greatly relieve the traffic of the bridge itself, as well as of Cheapside, Fleet-street, &c.

THE ROYAL SOCIETY AND THE GOVERNMENT.—At a special meeting of the Royal Society, held on the 3rd inst. the following resolution was passed, on the motion of Sir Benjamin Brodie, seconded by Professor Bell;—"That the council be authorized to accept and carry out the proposal of the Government, as to the occupation of Burlington House, on the understanding that the hall, which it is proposed to construct in the west wing, and which is to contain the portraits belonging to the Royal Society, shall be placed in the custody of the Royal Society, subject to the free use of it by the senate of the University of London at all times at which it may be required for their examinations and public meetings." The library of the Royal Society now comprises 45,000 volumes. The Linnean Society and the Chemical Society will also have accommodation given to them in Burlington House.

THE SMOKE NUISANCE.—A Bill brought down from the Lords on the 26th ult. repeals the provision in the 16th and 17th of Victoria, c. 128, which exempts glass and pottery works from the operation of the Act; but the repeal will not take effect until the 1st of January, 1858.

THOROUGHFARES.—I noticed an article in your paper recommending the formation of a street through Lincoln's-inn Fields, "north and south." The utility of such a street no one can deny, but I think we ought also to have one east and west, in continuation of Great Queen-street into Holborn, through the corner of Lincoln's-inn Fields to come out opposite Messrs. Day and Martin's, through Whetstone-park. This would take off immense traffic, which now proceeds round by the Strand into the City. The "bridge" over the Fleet-ditch would soon follow.

J. S. R.

TENDERS

For the central schools, at Hanwell:—

Jay	£43,480	0	0
Kelk	43,093	0	0
Ashby	42,650	0	0
Pipers	42,437	0	0
Macey	41,670	0	0
Lee and Son	41,440	0	0
Myers	40,800	0	0
Browne	39,587	0	0
Holland	38,984	0	0
Downs	38,960	0	0
Rich and Parry	38,881	0	0
Wilson	38,598	0	0
Crook	37,875	0	0
Ashby and Horner	37,810	0	0
Haward and Nixon	37,746	0	0
Lucas, Brothers	37,400	0	0
Brass	34,988	0	0

For mansion at Balcombe, Sussex, for J. A. Hankey, esq. Messrs. Clutton, architects:—

Hayward and Nixon	£16,596	0	0
Lawrence and Son	16,248	0	0
Piper	16,195	0	0
Cubitt	15,985	0	0
G. Smith	15,898	0	0
Lucas	15,830	0	0
Cheeseman	15,620	0	0
J. and C. I'Anson	14,996	0	0
Ashby and Horner	14,100	0	0

For offices, &c. for the Imperial Gas Company, 33 and 34, John-street, Bedford-row. Messrs. F. and F. Edwards, Architects:—

Holland	£1,949	0	0
King and Son	1,875	0	0
Ashby and Homer	1,784	0	0
J. and C. I'Anson	1,732	0	0
Mansfield	1,630	0	0

For "Healthy Homes," to be built in the district of St. James's. Mr. Bardwell, architect. Quantities by Messrs. Batstone and Hunt:—

Browne and Co.	£1,197	0	0
Lawrence	1,162	0	0
Gammon	1,157	0	0
Downes	1,120	0	0

To which 70*l.* are to be added for iron joists.

For the Congregational Church, Aylesbury, Buckinghamshire. Messrs. Poulton and Woodman, architects, Reading:—

Green (Aylesbury)	£1,604	0	0
Quarterman (Oxford)	1,670	0	0
Durley (Bierton)	1,610	0	0
Sharp and Cooper (Aylesbury)	1,492	0	0
Young and Co. (Oxford)	1,320	0	0

The materials of the old chapel are calculated to belong to the contractor.

Public buildings and markets, Ashby-de-la-Zouch. Mr. H. J. Stevens, architect, Derby. Quantities supplied:—

Dennett, Brothers (Nottingham)	£4,480	0	0
Cooper (Ashby-de-la-Zouch)	4,147	0	0
Wykes (Leicester)	3,997	0	0
Norman and Sons (Leicester)	3,879	0	0
Lindley and Firn (ditto)	3,759	0	0
Garland and Holland (Nottingham)	3,700	0	0
Ferguson (ditto)	3,650	0	0
Lilley (Measham), accepted	3,398	0	0

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THE Advertiser, aged 30, who has had considerable experience in land-surveying and planning, and is a good accountant, is desirous of employment as above, or as clerk, collector, time-keeper, or in any other situation of trust and confidence, where he can be of service to his employer, by diligence and strict attention to business. As immediate employment is the principal object, a moderate salary will be accepted. Satisfactory references can be given.—Address, A. B. 19, West-street, Stockton-on-Tees.

TEMPORARY ASSISTANCE. — The Advertiser can render valuable SERVICES to ARCHITECTS and SURVEYORS. Is a good and quick draughtsman, and willing to work on moderate terms.—Address, C. D. Office of "The Builder."

THE Advertiser, aged 25, with good testimonials, is desirous of an ENGAGEMENT as ASSISTANT to a CIVIL ENGINEER, or an ARCHITECT. Is a draughtsman, and conversant with land and engineering surveying, levelling, mapping, and the general duties of an Architect's or Engineer's Office. Has been connected with local Boards of Health, engaged upon large town surveys, and accustomed to superintend sanitary, building, and engineering works.—Address, Mr. L. A. 3, Grove-place, St. Giles'-road, Norwich.

TO BUILDERS AND OTHERS.

THE Advertiser, aged 31, a thoroughly competent Foreman and Clerk, well versed in the general routine of building-office work generally; a good draughtsman, quick estimater, who can measure up work, take out quantities, &c is desirous of an ENGAGEMENT.—Address, W. H. at Mr. Wakeford's, Langton-park-lodge, near Tunbridge-Wells, Kent.

TO ARCHITECTS.

THE Advertiser is desirous of obtaining a SITUATION in an office in town. He has been accustomed to prepare finished, working, and detailed drawings, and has had some experience in superintending and measuring works.—Address, A. G. F. Simmon's Library, Edgeware-road.

TO ARCHITECTS, SURVEYORS, AND CONTRACTORS.

THE Advertiser, aged 28, a good Draughtsman, both geometric and perspective, and well conversant with the duties of a land and building Surveyor, and who has had the sole superintendence of the erection of important works, OFFERS his SERVICES at a moderate salary.—Address, Mr. E. F. Office of "The Builder."

TO BUILDERS AND OTHERS.

THE Advertiser, having part of his time at his disposal, OFFERS his SERVICES in preparing plans, specifications, and estimates, or in taking out quantities, measuring work, &c.—Address, A. Z. Mr. Judd, Bookseller, Calthorpe-place, Gray's-inn-road.

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DOUCEUR, 100*l.* to 150*l.*—The Advertiser, a Young Man, aged 31, an ARCHITECT and first-rate DRAUGHTSMAN, possessing a thorough knowledge of the practical part of building, with some knowledge of civil engineering, desires an APPOINTMENT under a RAILWAY COMPANY, or on Government or other large Works, where he would be actively engaged in carrying out the ideas of a principal, superintending workmen &c &c. To any gentleman legally procuring the Advertiser permanent employment he will cheerfully pay one or other of the above sums. A moderate salary required, as permanency is the principal object in view.—Address, in the first instance, to X. Y. Z. Office of "The Builder."
N.B. The most honourable secrecy may be relied upon.

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ASSISTANT, age 31, WANTS a RE-ENGAGEMENT. Can get out contract or working drawings, plans, sections, or specifications. Fully able to carry out works in every detail.—Address, A. M. Z. Davies's Newspaper Office, Edgeware-road

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AN ASSISTANT, and first-rate Draughtsman, requires an ENGAGEMENT. — For particulars, address M. P. 8, Walcot-square, Newington.

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A YOUNG MAN, who has been brought up in the building trade, is desirous of obtaining EMPLOYMENT in a respectable firm, or a share in a moderate business.—Address, G. W. care of Mr. Glenton, 147, Bond-street, Oxford-street.

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A YOUNG MAN, aged 19, wishes to APPRENTICE himself, for a short term of years, to a WORKING MASTER; he has a knowledge of the business.—Address, A. B. 9, Shepherd-street, May-fair.

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AN experienced PRACTICAL CLERK in all matters relating to Building and Surveying desires an ENGAGEMENT, permanent or otherwise. Is a good finished and practical draughtsman, accurate in taking out quantities and estimating. Salary moderate. Good references.—Address, A. Y. 5, Gloucester-street, Regent's-park.

TO ARCHITECTS, &c.

A DRAUGHTSMAN offers his SERVICES. Salary moderate.—Address, to Mr. S. 9, Silchester-road, Notting-hill.

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A YOUNG MAN, aged 31, well connected, and of active and industrious habits, desires a SITUATION in an ARCHITECT'S or BUILDER'S OFFICE, or to Superintend and direct Workmen; has been accustomed to prepare fair and working drawings, draughting, specifications, &c. &c Good ideas of alterations, repairs, and other matters connected with the business. A moderate salary required. — Address, X. Office of "The Builder."

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TO ARCHITECTS, SURVEYORS, &c.

A YOUNG MAN, aged 25, the son of a builder, desirous of improvement, wishes for an ENGAGEMENT in an office of the above. Is a good draughtsman, can take out quantities, and has a knowledge of surveying, levelling, &c. Salary not a consideration.—Address, C. R. care of Mr. Warman, 3, Church-court, Clement's lane, Lombard-street.

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A RESPECTABLE MAN, aged 46, of many years' experience in the English and foreign timber trade, is desirous of EMPLOYMENT as CLERK, or MANAGER of a YARD, or otherwise. References and security given.—Address, G. S. Post-office, Upper Edmonton, Middlesex.

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A PRACTICAL MAN, experienced in the management of building, wishes an ENGAGEMENT in an Architect's Office; can execute working drawings, write out specifications, or take out quantities. Would accept a temporary engagement.—Addres, R. Mr. Judd, Bookseller, Calthorpe-place, Gray's-inn-road.

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AN ENGINEERING SURVEYOR, thirty years of age, is open to an ENGAGEMENT. Is perfectly competent in every branch of surveying, mapping, levelling, &c. He has had the sole management of the construction of waterworks and sewerage in a town in the north of England for the last two and a half years, which is now complete; he has also had considerable experience in private drainage and water supply. First-rate testimonials can be produced and satisfactory references given.—Address, S. H. W. care of Mr. J. Lord, Bookseller, &c. Northgate, Halifax.

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ANY GENTLEMAN connected with the Building line of business, to whom the services of a Grainer, Painter, Writer, &c. are necessary, either as FOREMAN and ASSISTANT CLERK, or merely to work as above, will be immediately replied to upon communicating with W. PREBBLE, 15, Bury-street, Bloomsbury.

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AS CLERK of WORKS.—A Respectable Man of experience in superintending very extensive public and private works, is desirous of an ENGAGEMENT.—Address, B. B. Office of "The Builder."

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A MIDDLE-AGED MAN, with unquestionable references as to ability and character, is open to an ENGAGEMENT; he is well acquainted with superintending works, measuring and estimating, and a very good accountant.—Address, Z. Z. Office of "The Builder."

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TO BUILDERS.

A YOUN MAN, aged 21, is desirous of LEARNING the BUSINESS; South of England preferred.—Address, stating amount of premium required, and other particulars, to J. A. 4, Avenue-terrace, Avenue-road, Bow, London.

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A GENTLEMAN, who has received a Professional Education, and who has for the last 15 years been extensively engaged both in Architectural and Building transactions, wishes to meet with a PARTNERSHIP, or a MANAGING CLERKSHIP, which would in a few years lead to a Partnership. Is perfectly competent to undertake the management of an office, to design and get up drawings, both finished and in detail, to make out specifications, and to undertake the general superintendence of works in progress. Has no objection to undertake the entire management of the architectural department of a business combining both the architect and surveyor.—Address, by letter only, to A. B. care of Mr. Wheeler, 7, Furnival's Inn, Holborn, London.

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Tracery for Parapets and Terraces, Mullions, Pinnacles, Moulded Bricks, Coats of Arms, Crosses, Label Mouldings, Friezes, Trusses, Vases, Balusters, Capitals and Bases of Columns, Paving, Facing Bricks, Coping, Kitchen and other Sinks, Chimney Shafts and Tops, and numerous other Articles, manufactured by J. M. BLASHFIELD, in Patent imperishable Terra-Cotta, at Mill-wall, Isle of Dogs; and sold at No. 1, Wharf, Praed-street, Paddington-basin.

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FREEHOLD GROUND, CHANCERY-LANE.—The Commissioners of Sewers of the City of London hereby give Notice, that they will MEET in the GUILDHALL of the said City, on TUESDAY, the 22nd of JULY next, at TWELVE at Noon precisely, to receive PROPOSALS for taking on BUILDING LEASE for EIGHTY YEARS, at a Ground Rent, certain PLOTS of GROUND, situate on the west side of Chancery lane, and near Fleet-street. Further particulars may be had, and plan seen, on application to Mr. HAYWOOD, Engineer to the Commission, at these Offices in the Guildhall, where forms of proposal may also be obtained. The Commissioners will require a plan and elevation of the premises proposed to be built, to be submitted to them for their approval, and do not bind themselves to accept any proposal unless deemed advantageous. Persons offering proposals must attend on the above day, and the party whose proposal is accepted will be required to execute an agreement at the time.

JOSEPH DAW, Principal Clerk.

Sewers Offices, Guildhall, June 3, 1856.

FREEHOLD BUILDING GROUND.—TO BE LET or SOLD, on advantageous terms, TWO PLOTS of GROUND, situate in the most preferable part of St. John's-wood.—For particulars, apply by letter, post-paid, to WILLIAM LEWIS, 2, Craven-terrace, Craven-hill, Paddington.

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BUILDING PLOT TO LET, at OLD BROMPTON, for Three Houses, four, six, or eight rooms; 46 feet 6 inches frontage; completes a street of new buildings, well tenanted; lease ninety-seven years, from the freeholder. Old sound materials permitted, and ground-rent pro rata with those erected.—Apply at the White Hart, Earl's Court-road.

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STRATFORD, ESSEX. — FREEHOLD LAND, within three miles of London, exonerated from land-tax and free of tithe, TO BE LET, on Lease, for a long term of years, in large or small plots, suitable for manufactories or building purposes.—Apply to Mr. W. H. DEAN, Auctioneer and Surveyor, Stratford; or to Mr. GEORGE POWNALL, Surveyor, 37, Bloomsbury-square, London.

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MOORE PARK ESTATE, KING'S-ROAD FULHAM.—Eligible LAND TO BE LET, on Building Leases, for long terms. Ground rents moderate, and advances will be made, if required. Plans, &c. can be inspected at the Estate Office, King's-road, near Stanley Bridge; or at Mr. Wales's Office, 8, Great St. Helen's, Bishopsgate.

TO BUILDERS.—FREEHOLD BUILD-ING LAND TO BE LET on LEASE, for a Term of 999 Years, at Norwood, Harrow, Stratford, Mitcham, Wimbledon, Chertsey, Ash, near Aldershott Camp, and Wharf-road, City-road. Cash advanced, if required.—Apply to Messrs. BLAKE and SNOW, Solicitors, 22, College-hill, Cannon-street, London.

KENSINGTON.—Valuable FREEHOLD PROPERTY.—The Mall, near Kensington Palace-gardens, Notting-hill.—FOUR HOUSES, freehold (with exception of a small part copyhold), with large gardens, 216 feet frontage 120 feet depth, in a highly important and improving neighbourhood; TO BE SOLD, or LET on long building leases.—Apply to Messrs. MAUGHAM and DIXON, Solicitors, 4, Raymond-buildings, Gray's-inn.

LAND for FACTORIES and DWELLING-HOUSES, most eligibly situate, lying between the River Wandle and Garratt-lane, at Wandsworth, and near Two Railway Stations, TO BE LET, in one or more plots, for Building purposes. Lease 99 years. Money advanced if required.—Apply to Mr. GEORGE LOW, Architect, 1, Church-court, Clement's-lane, City.

SUPERIOR FAMILY RESIDENCE WANTED, near Hyde or Regent's Park; if with stabling, preferred. Rent about 250*l.* Very full particulars are requested.—Address Z. M. P. care of Mr. Hammond, 27, Lombard-street.

OFFICES.—WESTMINSTER.—TO BE LET, a capital Ground-floor SUITE of OFFICES, adapted either for Professional Men, Law Stationers, or Lithographers.—Apply at No. 60, King-street, Parliament-street.

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TO BE SOLD, a well-built CARCASS of a six-roomed HOUSE, situate in a main road in the parish of St. Mary, Islington. Lease, ninety-six years, at a moderate ground-rent; half of the purchase-money might remain, and part would be taken in carpenter's and other work.—Apply at 20, Mildmay-park, Ball's Pond. Money would be advanced to finish, if required. This is a good opportunity, as this will complete a terrace-row of houses finished and let.

SIX HOUSES TO BE SOLD or LET, together or separately, held for a term of seventy-one years, consisting of four six-roomed and two seven-roomed, situate Nos. 32 to 37, Trinity-square, Brixton (near the church).—For terms and all particulars, apply personally to Mr. ELLIS, 17, Trinity-square, Brixton; or by letter, to Mr. W. J. LEACH, 1, Verulam-buildings, Gray's-inn.

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HANCOCK'S PATENT VULCANIZED INDIA-RUBBER TUBING, HOSE-PIPES, WASHERS, ENGINE-PACKING, both round and flat, and SOCKET-RINGS, for Hot-water-pipes. Vulcanized Rubber Door-springs, and Solid Round Rubber Cord of all sizes of any length. Billiard Cushions and Rubber Strips cut to any pattern for bagatelle tables.

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N.B. All communications and orders punctually attended to, addressed to the Manufactory, JAMES LYNE HANCOCK, Goswell-mews, Goswell-road, London.

HOSE PIPING.—WAITHMAN'S PATENT FLAX HOSE PIPING will sustain a greater pressure, is lighter, less bulky, will wear longer, and is about 60 per cent. cheaper than the leather hose pipe. Manufactured only by WAITHMAN & CO. Bentham, Lancaster.

No. 1 quality, inches diameter, and price per yard.

¾	1	1¼	1½	1¾	2	2½	2¾	2¾	3 in.
9d.	11d.	1s.1d.	1s.3d.	1s.5d.	1s.7d.	1s.9d.	2s.	2s.3d.	2s.6d. 2s.9d.

Super-extra stout quality.

2	2¼	2½	2¾	3 inches.
2s.	2s.3d.	2s.6d.	2s.9d.	3s. per yard.

No. 0. A cheaper hose, to bear a low pressure for gardens and agricultural purposes, at greatly reduced prices.

1	1¼	1½	2	2½	2½ inches.
9d.	10d.	11d.	1s.	1s.3d.	1s.6d. per yard.

The hose is Burnettized at an extra charge of 3d. per yard. Union Joints, Branch Pipes, and Jets, are also supplied.

TO BUILDERS.—The COMMITTEE of the WALWORTH LITERARY INSTITUTION will meet at their READING-ROOMS, No. 21, Manor-place, Walworth, Surrey, on the 11th INST. at NINE o'clock p.m. to receive TENDERS for ADDITIONS to be made to their LECTURE-HALL in Carter-street, Walworth. The plans, specification, and conditions can be seen at the Office of Mr. HENRY JARVIS, the Architect, 29, Trinity-square, Southwark. The Committee will not be bound to accept the lowest or any other Tender.

Dated June 2, 1856.

TO ARCHITECTS.

EXHIBITION and COMPETITION DRAWINGS, coloured or tinted, and superior LITHOGRAPHY, in its various branches, executed by Mr. T. J. RAWLINS (Author of Elementary Drawing Classes, adopted at Marlborough House; Outlines of Sculpture; Modern Architecture, &c.), 38, University-street, University College, London.

ARCHITECTURAL and MECHANICAL DRAWING CLASSES.—The Architects', Builders', Civil Engineers' and Machinists' Drawing Classes,—Offices, 15, OLD STREET, CITY ROAD, conducted by THOMAS J. HILL, Architect, &c. The class of Drawing taught at this Establishment is designed expressly for Architects', Builders', and Engineers' Sons, Assistants, and Clerks of Works, &c. The Drawings are all practical, and every facility is given to the pupils to acquire a thorough knowledge of the department they wish to learn. Taking out Quantities and Abstracting from Plans, and afterwards from the Building. Detail Prospectuses of the Morning and Evening Classes, together with a list of references, chiefly Architects, Builders, Engineers, &c. to be had at the Offices.

PUBLIC EXAMINATIONS in FREE-HAND and MECHANICAL DRAWING.—Notice is hereby given, that Examinations in Free-hand and Mechanical Drawing will be held by the Department of Science and Art at Marlborough House, Pall-mall, in July next. The Examinations are not limited to Students in the Schools of Art, but are open to all who intimate, on or before 1st July, by letter to the Registrar, their desire to be examined, and produce satisfactory specimens of their proficiency at the day of examination, which will be hereafter announced. Prizes of Instruments and Certificates will be granted to all who pass the requisite examination.

NORMAN MACLEOD, Registrar.

MATHEMATICAL DRAWING INSTRU-MENTS.—JOHN ARCHBUTT, 20, Westminster-Bridge-road, Lambeth (near Astley's Theatre), begs to call attention to his Stock of Instruments manufactured by superior workmen. The prices will be found considerably lower than ever charged for articles of similar quality and workmanship. Rules, scales, tapes, &c. at equally low prices. An illustrated price-list will be immediately forwarded, free, on application.

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ARCHITECTURE, CIVIL ENGINEER-ING, and SURVEYING CLASSES. Established by Messrs. HYDE, SMITH, and LEWIS, Architects, Civil Engineers, Surveyors, &c. For Preparing Gentlemen for Architects, Builders, Engineers, Surveyors, Draughtsmen, Measurers, &c. and for giving EVENING INSTRUCTION in Architectural, Civil Engineering, and Mechanical Drawing; Colouring, Shading and Tinting; Ornamental and Water-Colour Drawing; Perspective, Isometrical, and Geometrical Drawing, Making Finished and Working Drawings; Preparing Specifications, Taking out Quantities, Estimating, Measuring and Valuing Builders' Work, &c. &c. Terms:—Day Pupils, Three Guineas per Quarter; Evening Pupils, One Guinea per Quarter. There are no extras, the terms include the whole of the above, with the use of Drawing Boards, T Squares, Plans, Drawings, Models, &c. Prospectuses and full particulars may be had at the Offices, 24, Guildford-street, Russell-square.

TO ARCHITECTS.

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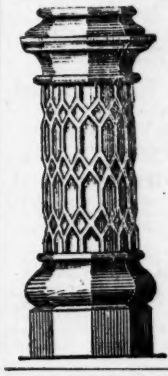

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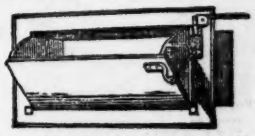

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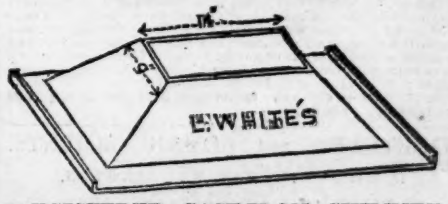

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Manufactured by J. M. BLASHFIELD, at Millwall, Isle of Dogs.
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PARIAN CEMENT is reduced in price, by the Patentees and Manufacturers, FRANCIS, BROTHERS, Nine Elms, London. This internal stucco may be painted or papered within a few hours of its application, and rooms be thus made dry and habitable immediately.

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ELMLEY CEMENT WORKS.—ROMAN and PORTLAND CEMENT of the first quality, manufactured on the above works. Also STOCK and KILN-BURNT BRICKS, hand moulded and machine made, for shipment or otherwise.—Apply to G. BOOTH, Agent, as above.

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ARTIFICIAL HYDRAULIC or PORTLAND CEMENT combines the valuable qualities of the natural Cements with the additional advantage that it greatly excels them in its cementitious properties; that it is not affected by frost, and does not vegetate in damp situations. Account of COMPARATIVE EXPERIMENTS on the strength of this and other Cements (read at the Institute of Civil Engineers), to be obtained from the Makers, JOHN BAZLEY WHITE, and BROTHERS, Millbank-street, Westminster, who prepare one quality only of Portland Cement.

THE PORTLAND CEMENT WORKS, NORTHFLEET, KENT.—Messrs. ROBINS and CO. to WHOM THE PRIZE MEDAL WAS AWARDED in 1851, are prepared to supply any quantity of the very best PORTLAND CEMENT, manufactured by them for all the purposes to which Cement is applicable. Orders received at Great Scotland-yard and at the Works.

BATH, PORTLAND, and ROMAN CEMENTS.—The London and West of England Cement Company can offer to the Trade the best natural HYDRAULIC CEMENTS at reduced prices. The Company particularly recommend the best quality of their Bath Cement for all modelling cornices, decorations, &c. as having all the qualities requisite for an interior cement, and being quite unaffected by extremes of weather. The Company also supply BLUE LIAS LIME, lump and ground, which will carry more sand than any in the market.—Communications to be addressed to the General Offices, 86, Old Broad-street, London; to Mr. MONUMENT, 4, Caroline-place, City-road; to Mr. TIMEWELL, the Depôt, 9, North Wharf-road, Paddington; or to the Works, Dunball, Bridgewater.

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Agent at the Works—Mr. THOMAS WEEKES.
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GREY STONE LIME WHARFS,
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WILLIAM PETERS begs to inform the trade he is in a position to supply the best GREY STONE LIME in any quantities from the above wharfs, or per barge direct from the kilns.
Large Grey Stone, or Grey Chalk, free on board at Works, 1s. 9d. per ton.
Small ditto, ditto, 4d. per ton.
Barges loaded in a few minutes.
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STENT'S COMPOSITION FOR PREPARING NEWLY-PLASTERED OR DAMP WALLS FOR PAPERING,
Is the result of practical experiments and long experience; it is unfailing in its application. Entire houses have been papered a few days after plastering. In repairs of old plastering it is invaluable. A moderate room can be papered for 2s. 6d.
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This mode of applying cement is suitable for sea groyne, sea walls, and for soldiers' huts, emigrants' dwellings, temporary churches, school-houses, and workmen's cottages, all of which may be built with greater rapidity and economy than with any other materials; good cement and sea beach, or washed gravel stones, only necessary.
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Two concrete models may be seen at FRANCIS' (BROTHERS), Cement Works, Nine Elms, London; and two soldiers' huts have been built by them for the Government, at Shorncliff Barracks, near Sandgate, Kent.

HUBBUCK'S WHITE BODY PAINT of superior body to the Best White Lead, whilst it is as smooth and permanent as Zinc Paint. One coat laid on as directed is equal to two coats of White Lead; whilst the consumption of material is less than for one coat. It dries very fast and hard.
HUBBUCK'S STONE COLOUR BODY PAINT the same as the former, at three-fourths the price.
HUBBUCK'S PATENT WHITE ZINC PAINT is invaluable for Iron Ships and iron exposed to salt water; neither bilge water, nor noxious vapours from cargo, nor heat on funnels of Steam Vessels act upon it. Sold by the Wholesale Paint Dealers, in original packages, stamped, HUBBUCK, LONDON, PATENT; and when so marked the quality is guaranteed.
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Full particulars of THOMAS HUBBUCK and SON, Paint and Varnish Works, opposite the London Docks, London.
OLD ZINC AND ZINC CUTTINGS BOUGHT TO ANY EXTENT.

PORTLAND CEMENT.—JAMES WESTON having enlarged that portion of his CEMENT WORKS on Millwall, Poplar, for Manufacturing the above CEMENT, begs to inform the Trade in general that they can be supplied with any quantity they may require, either at his Works, St. Andrew's Wharf, Earl-street, Blackfriars, or Middle Wharf, Scotland-yard, Westminster. Manufacturer of Roman, Lias, and Mastic Cements, English and French Plaster, &c.

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SOUTHAM HYDRAULIC BLUE LIAS LIME.
WILLIAM OLDHAM begs to inform those parties requiring genuine Hydraulic Blue Lias Lime, that he is prepared to deliver the best quality of ground and lump, into boats, at the Works.—Address, WILLIAM OLDHAM, Blue Lias Lime and Cement Works, Southam.

BLUE LIAS LIME.—Messrs. GREAVES and KIRSHAW having completed their Works on the Birmingham and Oxford line of the Great Western Railway, at Harbury, are now prepared to supply LUMP and GROUND LIME of the best quality, direct from the kilns, to all the Stations on the Great Western Railway.—Greaves's Blue Lias Lime.—Portland, Bath, and Lias Cement.—Works, at Harbury, Stockton, and Wilmcote.—Office, at Warwick.

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PORTLAND, ROMAN, AND OTHER CEMENTS,
TAMWORTH GLAZED SEWAGE PIPES
BLUE VITRIFIED BRICKS, COPINGS, PIPES, &c.

3 & 6, South Wharf, Paddington.
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All applications for prices and terms will meet with prompt attention.
N.B. Please observe the lime is ground at the works, not in London.

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Quality, Weight, and Measure may at all times be strictly relied on; references in proof of the above can be given.
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All orders addressed to the—
LONDON DEPOT, 16, SOUTH WHARF, PADDINGTON,
BLYTH, BROTHERS, SOLE AGENTS,
Will be promptly attended to, and any further information can be obtained from them.
Works, Stockton-field, near Southam, Warwickshire.

PLASTER of PARIS.—MESSRS. BLYTH, BROTHERS, beg to acquaint the trade, that they have made a considerable reduction in price; the quality they are now manufacturing cannot fail to give entire satisfaction. Samples and prices forwarded to any part of England, or the metropolis. No extra charge made to any wharf or railway station in London.—Any further information can be obtained at their Works, Baldwin's-place, Gray's-inn-lane, Holborn; or at the Blue Lias Lime Depôt, 16, South Wharf, Paddington.

BRICKS.—Malm Cutters, Yellow and Pale Seconds, Paviors, and Pickings, of good and sound quality, constantly on sale at H. DODD'S Brickfields, which are only a quarter of an hour's walk from the City. H. D. earnestly requests purchasers to favour him with a visit, in order to inspect his stock and to judge for themselves.
Malm Place, half-washed Stocks, and Place Bricks, also on sale. These bricks are sound, well burnt, and unusually free from defects; a very large proportion of the stock being suitable for external facing.
Apply to HENRY DODD and CO. at the Counting-house, Hoxton Brickfields, Grange-walk, near the Rosemary Branch, Hoxton.
N.B. Light-coloured Pit Sand of approved quality constantly on sale upon reasonable terms. This Sand, from its not containing any saline matter, is acknowledged to be preferable to river sand.

BRICKS of all kinds (clamp-burnt or kiln-burnt), Lime, Chalk, Chalk Rubbish for brick-making, Flints for building and pottery work, Foundry Loam, Whiting, Whiting Sand for ashphalte, Land Drain Pipes, Patent Drain Pipes, Gas Soil for brick-making, &c. &c. sent by barge from Messrs. MEESON and CO.'S works at Grays, Essex, to any part of the Thames, the various canals, the river Lea, &c. or by rail to any station on the London and Southend and Eastern Counties lines, or any railway connected with them. Vessels of 500 to 600 tons can load alongside the wharves at Grays. At MEESON and CO.'S wharf and kilns, Bow-bridge, Stratford, Essex, the above-named articles can also be procured, as well as all kinds of fire goods (both Welsh and Newcastle), Fire-clay, Flare-burnt Lime, and Marble and Temper Lime; and here lime is packed in hogsheads, casks, jars, &c. for exportation.
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Letters addressed to Grays Essex, will meet with immediate attention.

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WHITE SUFFOLK and RED FACING BRICKS.
COWLEY, KENT, and ESSEX BRICKS.
Also Yellow and Pale Malm Seconds, Cutters, Paviors, Shippers, &c.
KENTISH RAG-STONE of the FINEST QUALITY
MILLS and PRICE, 5, ADELAIDE-PLACE London-bridge.

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SECONDS AND CUTTERS ALWAYS ON HAND.
MILLS AND PRICE, 5, ADELAIDE-PLACE,
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THE BEST WHITE SUFFOLK and RED FACINGS:
WHITE SUFFOLK PERFORATED BRICKS;
DEEP-RED RUBBING BRICKS.
Also COWLEY and KENT STOCKS, in any quantities.
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(Within a short distance of the five bridges).
THE BEST MALM-CUTTERS, SECONDS, PICKINGS, and PAVIORS, in any quantity.
Also, STOCKS, of FIRST QUALITY.
J. EASTWOOD and SONS, Belvidere-road, Lambeth.

PRIZE BRICK-MAKING MACHINE.—Chamberlain's Patent.—This portable machine will make 20,000 solid bricks per day, of far superior quality to hand-made, with 3-horse power; one man to feed the machine with clay, and boys to remove the bricks. For a plate and description, see "Practical Mechanic's Journal," for January 1st, 1856.—Any further information, or the machines seen at work, on application to Mr. HUMPHREY CHAMBERLAIN, Kempsey, near Worcester.

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BEADON'S EAVES GUTTER TILES.—Mr. LAWES is prepared to CONTRACT for the ERECTION of the above TILES on roofs of all descriptions, in the neighbourhood of London, at 7d. per foot; above 100 feet, 6d.—Office, 1, Adelaide-place, London-bridge.

BEADON'S PATENT IMPERISHABLE GUTTER-TILES,
For Spouting Roofs of Houses (either old or new, whether of thatch, slate, or tile), and other structures.
SOLE AGENT,
J. B. LAWES, 1, Adelaide-place, London-bridge.
This is the cheapest kind of spouting known; for, besides its lower cost, it will last without paint or repair as long as the building itself. It will bear the weight of any ladder; and in case of accident a labourer can repair it. It occupies the room of a large amount of roofing, effecting a great saving in slates, tiles, &c. It is especially applicable to the backs of houses in town, cottages, and agricultural buildings.
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MINTON and CO.'S ENCAUSTIC and other PATENT TILES, for Churches, Entrance Halls, Conservatories, Balconies, &c.; Antique, Geometrical, and Alhambric Mosaics, manufactures of a highly decorative character, and extreme durability, Slabs and Tiles for Fireplaces and Hearths, Covings for Grates, Door Furniture, White Glazed and Ornamental Tiles for Baths, Dairies, and Kitchen Ranges, may be had, in great variety at their Warehouse, 9, Albion-place, Blackfriars-bridge, London; and at their Manufactory, Stoke-upon-Trent, Staffordshire.